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THE YEAR-BOOK

FOR

COLORISTS & DYERS

PRESENTING A REVIEW OF THE YEAR'S ADVANCES IN THE BLEACHING, DYEING, PRINTING, AND FINISHING OF TEXTILES

BY

HERMAN A. METZ

VOLUME XIV

NEW YORK
1911

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PREFACE

This is the Fourteenth Volume of the series presenting the novelties of the year 1911. The use of vat colors for all purposes is steadily increasing, and they will undoubtedly cause a general advance in the standards of fastness for all colors.

The author trusts this volume will be of interest.

HERMAN A. METZ.

122 HUDSON STREET, NEW YORK CITY, APRIL, 1912.

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PART I

Reference Tables

Reference Tables

THE METRIC SYSTEM, WITH EQUIVALENTS.

The entire metric system of weights and measures is based upon a fundamental unit called a meter, which is the ten-millionth part of the distance from the equator to the pole, and is the principal unit of linear measure.

The ARE, or unit of square measure, is a square whose side is 10 meters.

The STERE, or unit of cubic measure, is a cube whose edge is a meter.

The LITER, or unit of all measures of capacity, is a cube whose edge is the tenth of a meter.

The GRAM or unit of weight, is the weight of a cube of pure water at its greatest density, the edge of which is the hundredth part of a meter.

Elements of the System.

Length.	Surface.	Capacity.	Weight.	Notation.
			Metric ton.	1,000,000
			Quintal.	100,000
Myriameter.			Myriagram.	10,000
Kilometer.		Kiloliter.	Kilogram.	1,000
Hectometer.	Hectare.	Hectoliter.	Hectogram.	100
Decameter.	Decare.	Decaliter.	Decagram.	10
Meter.	*Are.*	*Liter.*	*Gram.*	1
Decimeter.		Deciliter.	Decigram.	.1
Centimeter.	Centiare.	Centiliter.	Centigram.	.01
Millimeter.		Milliliter.	Milligram.	.001

Linear, or Long Measure.

	Meters.	Inches.	Feet.	Yards.	Miles.
Millimeter	.001	.03937	.00328	.00109	....
Centimeter	.01	.3937	.03280	.01093	....
Decimeter	.1	3.937	.32808	.10936	.00006
Meter	1	[1] 39.37	3.28083	1.093611	.00062
Decameter	10	....	32.80833	10.93611	.00621
Hectometer	100	....	328.0833	109.3611	.06213
Kilometer	1,000	....	3280.833	1093.611	.62137
Myriameter	10,000	....	....	....	6.2137

[1] 39.37 inches is the legalized equivalent of the meter in the United States. The exact equivalent is 39.37079 inches.

Square Measure.

	Square Meters.	Square Inches.	Square Feet.	Square Yards.	Acres.
Milliare	.1	155	1.0764	.1196	....
Centiare, or square meter	1	1550	10.764	1.196	....
Deciare	10	....	107.64	11.96	.0024
Are, or square decameter	100	....	1076.4	119.6	.0247
Decare	1,000	....	....	1196	.2471
Hectare	10,000	....	....	....	2.471

A square centimeter equals 0.155 square inches, a square decimeter 15.5 square inches, and a square kilometer 0.386 square miles.

Cubic Measure.

	Cubic Meters.	Cubic Inches.	Cubic Feet.	Cubic Yards.
Millistere, or cubic decimeter	.001	61.023	.035314	....
Centistere	.01	610.23	.35314	.01308
Decistere	.1	....	3.5314	.1308
Stere, or cubic meter	1	....	35.314	1.308
Decastere	10	....	353.14	13.08
Hectostere	100	....	....	130.8

Measure of Capacity.

	Liters.	Fluid Ounces.	Quarts.	Gallons.	Bushels.
Milliliter, or cubic centimeter	.001	.0338	.00106	....	....
Centiliter	.01	.338	.01057	.00264	....
Deciliter	.1	3.38	.10567	.02642	.002838
Liter, or cubic decimeter	1	33.8	1.0567	.26417	.028377
Decaliter	10	338	10.567	2.6417	.283774
Hectoliter	100	....	105.67	26.417	2.83774
Kiloliter	1,000	....	....	264.17	28.3774
Myrialiter	10,000	....	....	2641.7	283.774

A liter of water at its maximum density weighs a kilogram.

Weight.

	Grams.	Grains.	Ounces Avoirdupois.	Pounds Avoirdupois.	Tons of 2240 Pounds.
Milligram	.001	.01543	....	....	....
Centigram	.01	.15432	....	....	....
Decigram	.1	1.54324	.0035	....	....
Gram	1	15.43236	.0353	.0022	....
Decagram	10	154.32356	.3527	.0220	....
Hectogram	100	1,543.23564	3.5274	.22046	....
Kilogram	1,000	15,432.35639	35.274	2.20462	.000984
Myriagram	10,000	....	....	22.0462	.009842
Quintal	100,000	....	....	220.462	.09842
Millier, or tonneau.	1,000,000	....	....	2204.62	.9842

COMPARISON OF METRIC SYSTEM WITH THE UNITED STATES METHOD OF WEIGHTS AND MEASURES.

(Arranged in Alphabetical Order.)

Are (100 square meters) = 119.6 square yards.

Bushel = 2150.42 cubic inches, 35.24 liters.

Centare (1 square meter) = 1550 square inches.

Centigram (1/100 gram) = 0.1543 grain.

Centiliter (1/100 liter) = 2.71 fluid drams, 0.338 fluid ounce.
Centimeter (1/100 meter) = 0.3937 inch.
1 Cubic centimeter = 16.23 minims (Apothecaries).
10 Cubic centimeters = 2.71 fluid drams (Apothecaries).
30 Cubic centimeters = 1.01 fluid ounces (Apothecaries).
100 Cubic centimeters = 3.38 fluid ounces (Apothecaries).
473 Cubic centimeters = 16.00 fluid ounces (Apothecaries).
500 Cubic centimeters = 16.90 fluid ounces (Apothecaries).
1000 Cubic centimeters = 33.81 fluid ounces (Apothecaries).
Decigram (1/10 gram) = 1.5432 grains.
Decimeter (1/10 meter) = 3.937 inches.
Deciliter (1/10 liter) = 0.845 gill.
Dekagram (10 grams) = 0.3527 ounce.
Dekaliter (10 liters) = 9.08 quarts (dry), 2.6418 gallons.
Dekameter (10 meters) = 393.7 inches.
Dram (Apothecaries or Troy) = 3.9 grams.
Foot = 0.3048 meter, or 30.48 centimeters.
Gallon = 3.785 liters.
Gill = 0.118295 liter, or 142 cubic centimeters.
Grain (Troy) = 0.064804 gram.
Grain = 0.0648.
Gram = 15.432 grains.
Hectare (10,000 square meters) = 2.471 acres.
Hectogram = 3.5274 ounces.
Hectoliter (100 liters) = 2.838 bushels, or 26.418 gallons.
Hectometer (100 meters) = 328 feet 1 inch.
Hundredweight (112 pounds Avoirdupois) = 50.8 kilograms.
Inch = 0.0254 meter.
Inch = 2.54 centimeters.
Inch = 25.40 millimeters.
Kilogram = 2.2046 pounds, or 35.274 ounces.
Kiloliter (1000 liters) = 1.308 cubic yards, or 264.18 gallons.
Kilometer (1000 meters) = 0.62137 mile (3280 feet 10 inches).
Liter = 1.0567 quarts, 0.264 gallon (liquid), or 0.908 quart (dry)
Meter = 39.3700 inches, or 3.28083 feet.

Mile = 1.609 kilometers.
Mile = 5280 feet, or 1609.3 meters.
Millier or tonneau = 2204.6 pounds.
Milligram = 0.0154 grain.
Millimeter (1/1000 meter) = 0.0394 inch.
Myriagram = 22.046 pounds.
Myriameter (10,000 meters) = 6.2137 miles.
Ounce (Avoirdupois) = 28.350 grams.
Ounce (fluid) = 28.3966 cubic centimeters.
Ounce (Troy or Apothecaries) = 31.104 grams.
Peck = 9.08 liters.
Pint (liquid) = 0.47318 liter.
Pound (Avoirdupois) = 453.603 grams.
Pound (English) = 0.453 kilogram.
Pound (Troy) = 373.25 grams.
Quart (liquid) = 0.94636 liter.
Quintal = 220.46 pounds.
Scruple (Troy) = 1.296008 grams.
Ton = 20 hundredweight = 2240 pounds (Avoirdupois) 1016.070 kilograms.
Yard = 0.9144 meter.

TABLE OF MULTIPLES.

Centimeters × 0.3937 = inches.
Centimeters × 0.0328 = feet.
Centimeters, cubic, × 0.0338 = apothecaries' fluid ounces.
Diameter of a circle × 3.1416 = circumference.
Gallons × 3.785 = liters.
Gallons × 0.833565 = imperial gallons.
Gallons, imperial, × 1.199666 = U. S. gallons.
Gallons × 8.33505 = pounds of water.
Gallons, imperial, × 10 = pounds of water.
Gallons, imperial, × 4.54102 = liters.
Grains × 0.0648 = grams.
Inches × 0.0254 = meters.

Inches $\times$ 25.4 = millimeters.
Miles $\times$ 1.609 = kilometers.
Ounces, Troy, $\times$ 1.097 = ounces of avoirdupois.
Ounces, avoirdupois, $\times$ 0.9115 = ounces Troy.
Pounds, avoirdupois, $\times$ 0.4536 = kilograms.
Pounds, avoirdupois, $\times$ 0.8228572 = pounds Troy.
Pounds, Troy, $\times$ 0.37286 = kilograms.
Pounds, Troy, $\times$ 1.21527 = pounds avoirdupois.
Radius of a circle = 6.283185 $\times$ circumference.
Square of the radius $\times$ 3.1416 = area.
Square of the circumference of a circle $\times$ 0.07958 = area.

MISCELLANEOUS MEASURES.

Barrel of flour = 196 pounds.
Barrel of salt = 280 pounds.
Bale of cotton (in America) = 400 pounds.
Bale of cotton (in Egypt) = 90 pounds.
Bag of Sea Island cotton = 300 pounds.
Cable = 120 fathoms.
Can = 35 pounds.
Cask of lime = 240 pounds.
Fathom = 6 feet.
Hand = 4 inches.
Hogshead = 63 gallons.
Keg (nails) = 100 pounds.
Noggin or Nog. = $\frac{5}{16}$ of a pint.
Pace = 3.3 feet.
Palm = 3 inches.
Pipe = 2 hogsheads.
Stone = 14 pounds.
Tun = 2 pipes.
Cubic foot of water weighs 62.4 pounds.
Cubic foot of water is 7.48 gallons.
Gallon of water weighs 8⅓ pounds.
Gallon of water is 231 cubic inches.

Reference Tables

In England, wool is sold by the sack, or boll, of 22 stones, which, at 14 pounds to the stone, is 308 pounds.

A pack of wool is 17 stones and 2 pounds, which is rated as a pack load for a horse. It is 240 pounds.

Sack of flour = 280 pounds.

A tod of wool is 2 stones of 14 pounds.

A wey of wool is 6½ tods. Two weys, a sack.

A clove of wool is half a stone.

THERMOMETRY.

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
—10	—23.33	13	—10.56	36	2.22
—9	—22.78	14	—10.00	37	2.78
—8	—22.22	15	—9.44	38	3.33
—7	—21.67	16	—8.89	39	3.89
—6	—21.11	17	—8.33	40	4.44
—5	—20.56	18	—7.78	41	5.00
—4	—20.00	19	—7.22	42	5.56
—3	—19.44	20	—6.67	43	6.11
—2	—18.89	21	—6.11	44	6.67
—1	—18.33	22	—5.56	45	7.22
0	—17.78	23	—5.00	46	7.78
1	—17.22	24	—4.44	47	8.33
2	—16.67	25	—3.89	48	8.89
3	—16.11	26	—3.33	49	9.44
4	—15.56	27	—2.78	50	10.00
5	—15.00	28	—2.22	51	10.56
6	—14.44	29	—1.67	52	11.11
7	—13.89	30	—1.11	53	11.67
8	—13.33	31	—0.56	54	12.22
9	—12.78	32	—0.00	55	12.78
10	—12.22	33	0.56	56	13.33
11	—11.67	34	1.11	57	13.89
12	—11.11	35	1.67	58	14.44

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
59	15.00	93	33.89	127	52.78
60	15.66	94	34.44	128	53.34
61	16.11	95	35.00	129	53.89
62	16.67	96	35.56	130	54.45
63	17.22	97	36.11	131	55.00
64	17.78	98	36.67	132	55.56
65	18.33	99	37.22	133	56.12
66	18.89	100	37.78	134	56.67
67	19.44	101	38.34	135	57.23
68	20.00	102	38.89	136	57.78
69	20.56	103	39.45	137	58.34
70	21.11	104	40.00	138	58.89
71	21.67	105	40.56	139	59.45
72	22.22	106	41.12	140	60.00
73	22.78	107	41.67	141	60.56
74	23.33	108	42.23	142	61.12
75	23.89	109	42.78	143	61.67
76	24.44	110	43.34	144	62.23
77	25.00	111	43.89	145	62.78
78	25.56	112	44.45	146	63.34
79	26.11	113	45.00	147	63.89
80	26.67	114	45.56	148	64.45
81	27.22	115	46.22	149	65.00
82	27.78	116	46.67	150	65.56
83	28.33	117	47.23	151	66.12
84	28.89	118	47.78	152	66.67
85	29.44	119	48.34	153	67.23
86	30.00	120	48.89	154	67.78
87	30.56	121	49.45	155	68.34
88	31.11	122	50.00	156	68.89
89	31.67	123	50.56	157	69.45
90	32.22	124	51.12	158	70.00
91	32.78	125	51.67	159	70.56
92	33.33	126	52.23	160	71.12

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
161	71.67	195	90.56	229	109.44
162	72.23	196	91.12	230	110.00
163	72.78	197	91.67	231	110.55
164	73.34	198	92.23	232	111.11
165	73.89	199	92.78	233	111.67
166	74.45	200	93.34	234	112.22
167	75.00	201	93.89	235	112.78
168	75.56	202	94.44	236	113.33
169	76.12	203	95.00	237	113.89
170	76.67	204	95.55	238	114.44
171	77.23	205	96.11	239	115.00
172	77.78	206	96.67	240	115.55
173	78.34	207	97.22	241	116.11
174	78.89	208	97.78	242	116.67
175	79.45	209	98.33	243	117.22
176	80.00	210	98.89	244	117.78
177	80.56	211	99.44	245	118.33
178	81.12	212	100.00	246	118.89
179	81.67	213	100.55	247	119.44
180	82.23	214	101.11	248	120.00
181	82.78	215	101.67	249	120.55
182	83.34	216	102.22	250	121.11
183	83.89	217	102.78	251	121.67
184	84.45	218	103.33	252	122.22
185	85.00	219	103.89	253	122.78
186	85.56	220	104.44	254	123.33
187	86.12	221	105.00	255	123.89
188	86.67	222	105.55	256	124.44
189	87.23	223	106.11	257	125.00
190	87.78	224	106.67	258	125.55
191	88.34	225	107.22	259	126.11
192	88.89	226	107.78	260	126.67
193	89.45	227	108.33	261	127.22
194	90.00	228	108.89	262	127.78

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
263	128.33	264	128.89	266	130.00
		265	129.44		

A method to transform Fahrenheit to Centigrade, or *vice versa,* is the formula:

$$\frac{C \times 9}{5} + 32 \text{ equals Fahrenheit.—}$$

$$F - 32 \times \frac{5}{9} \text{ equals Centigrade.}$$

Comparison Between the Scales of Fahrenheit, Réaumur, and the Centigrade.

(Zero Fahrenheit corresponds with minus 17.8 Centigrade and minus 14.2 Réaumur.)

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
100	212	80	81	177.8	64.8
99	210.2	79.2	80	176	64.
98	208.4	78.4	79	174.2	63.2
97	206.6	77.6	78	172.4	62.4
96	204.8	76.8	77	170.6	61.6
95	203	76	76	168.8	60.8
94	201.2	75.2	75	167	60
93	199.4	74.4	74	165.2	59.2
92	197.6	73.6	73	163.4	58.4
91	195.8	72.8	72	161.6	57.6
90	194	72	71	159.8	56.8
89	192.2	71.2	70	158	56
88	190.4	70.4	69	156.2	55.2
87	188.6	69.6	68	154.4	54.4
86	186.8	68.8	67	152.6	53.6
85	185	68	66	150.8	52.8
84	183.2	67.2	65	149	52
83	181.4	66.4	64	147.2	51.2
82	179.6	65.6	63	145.4	50.4

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
62	143.6	49.6	28	82.4	22.4
61	141.8	48.8	27	80.6	21.6
60	140	48	26	78.8	20.8
59	138.2	47.2	25	77	20
58	136.4	46.4	24	75.2	19.2
57	134.6	45.6	23	73.4	18.4
56	132.8	44.8	22	71.6	17.6
55	131	44	21	69.8	16.8
54	129.2	43.2	20	68	16
53	127.4	42.4	19	66.2	15.2
52	125.6	41.6	18	64.4	14.4
51	123.8	40.8	17	62.6	13.6
50	122	40	16	60.8	12.8
49	120.2	39.2	15	59	12
48	118.4	38.4	14	57.2	11.2
47	116.6	37.6	13	55.4	10.4
46	114.8	36.8	12	53.6	9.6
45	113	36	11	51.8	8.8
44	111.2	35.2	10	50	8
43	109.4	34.4	9	48.2	7.2
42	107.6	33.6	8	46.4	6.4
41	105.8	32.8	7	44.6	5.6
40	104	32	6	42.8	4.8
39	102.2	31.2	5	41	4
38	100.4	30.4	4	39.2	3.2
37	98.6	29.6	3	37.4	2.4
36	96.8	28.8	2	35.6	1.6
35	95	28	1	33.8	0.8
34	93.2	27.2	Zero	32	Zero
33	91.4	26.4	—1	30.2	—0.8
32	89.6	25.6	—2	28.4	—1.6
31	87.8	24.8	—3	26.6	—2.4
30	86	24	—4	24.8	—3.2
29	84.2	23.2	—5	23	—4

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
—6	21.2	—4.8	—28	—18.4	—22.4
—7	19.4	—5.6	—29	—20.2	—23.2
—8	17.6	—6.4	—30	—22	—24
—9	15.8	—7.2	—31	—23.8	—24.8
—10	14	—8	—32	—25.6	—25.6
—11	12.2	—8.8	—33	—27.4	—26.4
—12	10.4	—9.6	—34	—29.2	—27.2
—13	8.6	—10.4	—35	—31	—28
—14	6.8	—11.2	—36	—32.8	—28.8
—15	5	—12	—37	—34.6	—29.6
—16	3.2	—12.8	—38	—36.4	—30.44
—17	1.4	—13.6	—39	—38.2	—31.2
—18	—0.4	—14.4	—40	—40	—32
—19	—2.2	—15.2	—41	—41.8	—32.8
—20	—4	—16	—42	—43.6	—33.6
—21	—5.8	—16.8	—43	—45.4	—34.4
—22	—7.6	—17.6	—44	—47.2	—35.2
—23	—9.4	—18.4	—45	—49	—36
—24	—11.2	—19.2	—46	—50.8	—36.8
—25	—13	—20	—47	—52.6	—37.6
—26	—14.8	—20.8	—48	—54.4	—38.4
—27	—16.6	—21.6	—49	—56.2	—39.2

Reference Tables

AEROMETRY OR HYDROMETRY.

COMPARISON BETWEEN THE SPECIFIC GRAVITY OF BEAUMÉ AND TWADDLE.

TO CHANGE FROM TWADDLE SCALE TO SPECIFIC GRAVITY, OR FROM GRAVITY TO TWADDLE SCALE.

In order to change degrees Twaddle into specific gravity, multiply by 5, add 1000, and divide by 1000. Example: Change 168° Twaddle into specific gravity.

$$
\begin{array}{r l}
 & \underline{168} \times 5 \\
 & 840 \\
 & \underline{1{,}000} \\
1{,}000) & \underline{1.840} \\
 & 1.84 \text{ Spec. Grav.}
\end{array}
$$

To change specific gravity into degrees Twaddle, multiply by 1000, subtract 1000, and divide by 5. Example: Change 1.84 specific gravity into degrees Twaddle.

$$
\begin{array}{r l}
 & \underline{1.84} \times 1{,}000 \\
 & 1{,}840 \\
 & \underline{1{,}000} \\
5) & \underline{840} \\
 & 168^{\circ} \text{ Tw.}
\end{array}
$$

The degrees of Twaddle's hydrometer are easily turned into specific gravity numbers—a quality which makes it preferable to any other hydrometer in use. The rule is to multiply the indicated degree by 5, and add 1000 to the product; for example, 9 degrees Twaddle equals specific gravity 1045; 25 degrees Twaddle equals specific gravity 1125; 100 degrees Twaddle equals specific gravity 1500; and so on. To bring specific gravity numbers to degrees of Twaddle, subtract 1000, and divide the remainder by 5; for example: specific gravity 1000 degrees equals 20 degrees Twaddle.

If the sample is too viscous to determine the density directly, a weighed portion of it can be first diluted with a weighed quantity of water, or a weighed portion can be dissolved and diluted to a known volume with water. In the first instance the per cent. of total solids is to be calculated by the following formula:

$$\text{Per cent. of solids in the undiluted material} = \frac{WS}{w}.$$

S = per cent. of solids in the diluted material.
W = weight of the diluted material.
w = weight of the sample taken for dilution.

If the dilution was made to a definite volume, the following formula is to be used:

$$\text{Per cent. of solids in the undiluted material} = \frac{VDS}{w}.$$

V = volume of the diluted solution.
D = specific gravity of the diluted solution.
S = per cent. of solids in the diluted solution.
w = weight of the sample taken for dilution.

To reduce a liquid to a desired specific gravity:
Let v equal the volume of the first liquid.
Let B equal the Beaumé of the first liquid.
Let b equal the Beaumé of the second or reducing liquid.
Let a equal the Beaumé required.
Let z equal the volume of the reducing liquid.

$$z = \frac{av - vB}{b - a}.$$

SULPHURIC ACID.

The Manufacturing Chemists' Association in 1904 adopted the following figures as representing the per cent. of H_2SO_4 in an oil of vitriol. Since colorists rarely or never need to look up an acid

below 80 per cent. oil of vitriol, the table only goes to that degree.

Beaumé.°	Specific Gravity.	Tw.°	H_2SO_4. Per Cent.	Oil of Vitriol. Per cent.
66	1.8354	167.1	93.19	100
65¾	1.8297	165.9	91.80	98.51
65½	1,8239	164.8	90.60	97.22
65¼	1.8182	163.6	89.55	96.10
65	1.8125	162.5	88.65	95.13
64¾	1.8068	161.4	87.81	94.23
64½	1.8012	160.2	87.04	93.40
64¼	1.7957	159.1	86.33	92.64
64	1.7901	158.0	85.66	91.92
63	1.7683	153.7	83.34	89.43
62	1.7470	149.4	81.30	87.24
61	1.7262	145.2	79.43	85.23
60	1.7059	141.2	77.67	83.35
59	1.6860	137.2	75.99	81.54
58	1.6667	133.3	74.36	79.97

SPECIFIC GRAVITY OF ACETIC ACID SOLUTIONS 15° C.

Specific Gravity.	Per cent.	Specific Gravity.	Per cent
1.0007	1	1.0157	11
1.0022	2	1.0171	12
1.0037	3	1.0185	13
1.0052	4	1.0200	14
1.0067	5	1.0214	15
1.0083	6	1.0228	16
1.0098	7	1.0242	17
1.0113	8	1.0256	18
1.0127	9	1.0270	19
1.0142	10	1.0284	20

Reference Tables

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.0298	21	1.0646	54
1.0311	22	1.0653	55
1.0324	23	1.0660	56
1.0337	24	1.0666	57
1.0350	25	1.0673	58
1.0363	26	1.0679	59
1.0375	27	1.0685	60
1.0388	28	1.0691	61
1.0400	29	1.0697	62
1.0412	30	1.0702	63
1.0424	31	1.0707	64
1.0436	32	1.0712	65
1.0447	33	1.0717	66
1.0459	34	1.0721	67
1.0470	35	1.0725	68
1.0481	36	1.0729	69
1.0492	37	1.0733	70
1.0502	38	1.0737	71
1.0513	39	1.0740	72
1.0523	40	1.0742	73
1.0533	41	1.0744	74
1.0543	42	1.0746	75
1.0552	43	1.0747	76
1.0562	44	1.0748	77
1.0571	45	1.0748	78
1.0580	46	1.0748	79
1.0589	47	1.0748	80
1.0598	48	1.0747	81
1.0607	49	1.0746	82
1.0615	50	1.0744	83
1.0623	51	1.0742	84
1.0631	52	1.0739	85
1.0638	53	1.0736	86

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.0731	87	1.0674	94
1.0726	88	1.0660	95
1.0720	89	1.0644	96
1.0713	90	1.0625	97
1.0705	91	1.0604	98
1.0696	92	1.0580	99
1.0686	93	1.0553	100

NOTE.—The specific gravity 1.0553 may indicate either of two solutions of different strengths. To determine whether an acid is stronger than 78 per cent. (the maximum specific gravity) some water is added; if the specific gravity rises it is stronger, if it falls it is weaker than 78 per cent. acid.

SPECIFIC GRAVITY OF HYDROCHLORIC ACID SOLUTIONS AT 15° C.

Beaumé.°	Specific Gravity.	Tw.°	Per cent. HCl.
1.00	1.0069	1.38	1.40
2.00	1.0140	2.80	2.82
3.00	1.0211	4.22	4.25
4.00	1.0284	5.68	5.69
5.00	1.0357	7.14	7.15
5.50	1.0394	7.88	7.89
6.00	1.0432	8.64	8.64
6.50	1.0469	9.38	9.40
7.00	1.0507	10.17	10.17
7.50	1.0545	10.90	10.94
8.00	1.0584	11.68	11.71
8.50	1.0623	12.46	12.48
9.00	1.0662	13.24	13.26
9.50	1.0701	14.02	14.04
10.00	1.0741	14.82	14.83

Beaumé.°	Specific Gravity.	Tw.°	Per cent. HCl.
10.50	1.0781	15.62	15.62
11.00	1.0821	16.42	16.41
11.50	1.0861	17.22	17.21
12.00	1.0902	18.04	18.01
12.50	1.0943	18.86	18.82
13.00	1.0985	19.70	19.63
13.50	1.1027	20.54	20.45
14.00	1.1069	21.38	21.27
14.50	1.1111	22.22	22.09
15.00	1.1154	23.08	22.92
15.50	1.1197	23.94	23.75
16.0	1.1240	24.80	24.57
16.5	1.1283	25.66	25.39
17.0	1.1328	26.56	26.22
17.5	1.1372	27.44	27.07
18.0	1.1417	28.34	27.92
18.5	1.1462	29.24	28.78
19.0	1.1508	30.16	29.65
19.5	1.1554	31.08	30.53
20.0	1.1600	32.00	31.45
20.5	1.1647	32.94	32.38
21.0	1.1694	33.88	33.31
21.5	1.1741	34.82	34.26
22.0	1.1789	35.78	35.21
22.5	1.1836	36.72	36.16
23.0	1.1885	37.70	37.14
23.5	1.1934	38.68	38.26
24.0	1.1983	39.66	39.41
24.5	1.2033	40.66	40.55
25.0	1.2083	41.66	41.72
25.5	1.2134	42.68	43.40

FORMALDEHYDE—SPECIFIC GRAVITY OF SOLUTIONS.

Specific Gravity at 15.6°C.	Per cent. by Weight.	Per cent. by Volume.
1.0025	1.0	1.0
1.0125	5.0	5.0
1.0250	10.0	10.25
1.0380	15.0	15.6
1.0530	20.0	21.1
1.0670	25.0	26.7
1.0830	30.0	32.5
1.1040	35.0	38.6
1.1250	40.0	45.0

This table is by W. A. Davis, in the Journal of Society of Chemical Industry, 1897, 502.

BLEACHING POWDER (CALCIUM HYPOCHLORITE) SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degrees Bé.	Per cent. Available Cl
1.008	1	0.5
1.015	2	1.0
1.023	3	1.5
1.030	4	2.0
1.037	5	2.5
1.045	6	3.0
1.053	7	3.5
1.060	8	4.0
1.069	9.2	4.5
1.078	10.4	5.0
1.087	11.5	5.5
1.097	12.6	6.0
1.105	13.6	6.4

CALCIUM ACETATE SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degrees Bé.	Per cent. $Ca(C_2H_3O_2)_2$
1.0260	3.4	5
1.0530	7.1	10
1.0792	10.5	15
1.1051	13.6	20
1.1321	16.8	25
1.1594	19.8	30

NITRIC ACID—SPECIFIC GRAVITY AND STRENGTH OF SOLUTIONS AT 15° C.

Beaumé.°	Specific Gravity.	Tw.°	Per cent. HNO_3.
10.00	1.0741	14.82	12.86
11.00	1.0821	16.42	14.13
12.00	1.0902	18.04	15.41
13.00	1.0985	19.70	16.72
14.00	1.1069	21.38	18.04
15.00	1.1154	23.08	19.36
16.00	1.1240	24.80	20.69
17.00	1.1328	26.56	22.04
18.00	1.1417	28.34	23.42
19.00	1.1508	30.16	24.82
20.00	1.1600	32.00	26.24
21.00	1.1694	33.88	27.67
22.00	1.1789	35.78	29.07
23.00	1.1885	37.70	30.49
24.00	1.1983	39.66	31.94
25.00	1.2083	41.66	33.42
26.00	1.2185	43.70	34.94
27.00	1.2288	45.76	36.48
28.00	1.2393	47.86	38.06
29.00	1.2500	50.00	39.66

Beaumé.°	Specific Gravity.	Tw.°	Per cent. HNO_3.
30.00	1.2609	52.18	41.30
30.50	1.2664	53.28	42.14
31.00	1.2719	54.38	43.00
31.50	1.2775	55.50	43.89
32.00	1.2832	56.64	44.78
32.50	1.2889	57.78	45.68
33.00	1.2946	58.92	46.58
33.50	1.3004	60.08	47.49
34.00	1.3063	61.26	48.42
34.50	1.3122	62.44	49.35
35.00	1.3182	63.64	50.32
35.50	1.3242	64.84	51.30
36.00	1.3303	66.06	52.30
36.50	1.3364	67.28	53.52
37.00	1.3426	68.52	54.36
37.50	1.3488	69.76	55.43
38.00	1.3551	71.02	56.52
38.50	1.3615	72.30	57.65
39.00	1.3679	73.58	58.82
39.50	1.3744	74.88	60.06
40.00	1.3810	76.20	61.38
40.50	1.3876	77.52	62.77
41.00	1.3942	78.84	64.20
41.50	1.4010	80.20	65.67
42.00	1.4078	81.56	67.18
42.25	1.4112	82.24	67.95
42.50	1.4146	82.92	68.73
42.75	1.4181	83.62	69.52
43.00	1.4216	84.32	70.33
43.25	1.4251	85.02	71.15
43.50	1.4286	85.72	71.98
43.75	1.4321	86.42	72.82
44.00	1.4356	87.12	73.67

Beaumé.°	Specific Gravity.	Tw.°	Per cent. HNO_3.
44.25	1.4392	87.84	74.53
44.50	1.4428	88.56	75.40
44.75	1.4464	89.28	76.28
45.00	1.4500	90.00	77.17
45.25	1.4536	90.72	78.07
45.50	1.4573	91.46	79.03
45.75	1.4610	92.20	80.04
46.00	1.4646	92.92	81.08
46.25	1.4684	93.68	82.18
46.50	1.4721	94.42	83.33
46.75	1.4758	95.16	84.48
47.00	1.4796	95.92	85.70
47.25	1.4834	96.68	86.98
47.50	1.4872	97.44	88.32
47.75	1.4910	98.20	89.76
48.00	1.4948	98.96	91.35
48.25	1.4987	99.74	93.13
48.50	1.5026	100.52	95.11

ALUMINIUM ACETATE SOLUTIONS — STRENGTH AND SPECIFIC GRAVITY AT 17° C.

Specific Gravity.	Degrees Beaumé.	Per cent. Al_2O_3.
1.012	1.6	0.5
1.025	3.4	1.0
1.038	5.0	1.5
1.050	6.7	2.0
1.062	8.3	2.5
1.074	9.9	3.0
1.086	11.3	3.5
1.098	12.8	4.0
1.100	13.0	4.5

ALUMINIUM NITRO-ACETATE SOLUTIONS—SPECIFIC GRAVITY AND STRENGTH AT 17° C.

Specific Gravity.	Degrees Beaumé.	Per cent. Al_2O_3.
1.012	1.6	0.5
1.025	3.4	1.0
1.039	5.3	1.5
1.054	7.2	2.0
1.068	9.1	2.5
1.083	11.0	3.0
1.097	12.7	3.5
1.112	14.4	4.0
1.126	16.1	4.5
1.141	17.8	5.0
1.156	19.4	5.5
1.160	19.8	5.64

ALUMINIUM SULPHATE SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. $Al_2(SO_4)_3$.	Specific Gravity.	Per cent. $Al_2(SO_4)_3$.
1.0170	1	1.1467	14
1.0270	2	1.1574	15
1.0370	3	1.1668	16
1.0470	4	1.1770	17
1.0569	5	1.1876	18
1.0670	6	1.1971	19
1.0768	7	1.2074	20
1.0870	8	1.2168	21
1.0968	9	1.2274	22
1.1071	10	1.2375	23
1.1171	11	1.2473	24
1.1270	12	1.2573	25
1.1369	13		

ALUMINIUM CHLORIDE SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. Al_2Cl_6.	Specific Gravity.	Per cent. Al_2Cl_6.
1.00721	1	1.17092	22
1.01443	2	1.17953	23
1.02164	3	1.18815	24
1.02885	4	1.19676	25
1.03603	5	1.20584	26
1.04353	6	1.21493	27
1.05099	7	1.22406	28
1.05845	8	1.23310	29
1.06591	9	1.24219	30
1.07337	10	1.25184	31
1.08120	11	1.26149	32
1.08902	12	1.27115	33
1.09684	13	1.28080	34
1.10466	14	1.29046	35
1.11248	15	1.30066	36
1.12073	16	1.31086	37
1.12897	17	1.32106	38
1.13721	18	1.33126	39
1.14545	19	1.34146	40
1.15370	20	1.35224	41
1.16231	21	1.35359	41.126

SODA SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degree Bé.	Per cent. by Weight. Na_2CO_3	$Na_2CO_3 + 10H_2O$.
1.007	1	0.67	1.807
1.014	2	1.33	3.587
1.022	3	2.09	5.637
1.029	4	2.76	7.444
1.036	5	3.43	9.251
1.045	6	4.29	11.570

Specific Gravity.	Degree Bé.	Per cent. by Weight. Na_2CO_3	$Na_2CO_3 + 10H_2O$.
1.052	7	4.94	13.323
1.060	8	5.71	15.400
1.067	9	6.37	17.180
1.075	10	7.12	19.203
1.083	11	7.88	21.252
1.091	12	8.62	23.248
1.100	13	9.43	25.432
1.108	14	10.19	27.482
1.116	15	10.95	29.532
1.125	16	11.81	31.851
1.134	17	12.61	34.009
1.142	18	13.16	35.493
1.152	19	14.24	38.405

SPECIFIC GRAVITY OF CAUSTIC SODA SOLUTION 15° C.

Sp. G.	Bé.	%NaOH	Sp. G.	Bé.	%NaOH	Sp. G.	Bé.	%NaOH
1.007	1	0.61	1.142	18	12.64	1.320	35	28.83
1.014	2	1.20	1.152	19	13.55	1.332	36	29.93
1.022	3	2.00	1.162	20	14.37	1.345	37	31.22
1.029	4	2.71	1.171	21	15.13	1.357	38	32.47
1.036	5	3.35	1.180	22	15.91	1.370	39	33.69
1.045	6	4.00	1.190	23	16.77	1.383	40	34.96
1.052	7	4.64	1.200	24	17.67	1.397	41	36.25
1.060	8	5.29	1.210	25	18.58	1.410	42	37.47
1.067	9	5.87	1.220	26	19.58	1.424	43	38.80
1.075	10	6.55	1.231	27	20.59	1.438	44	39.99
1.083	11	7.31	1.241	28	21.42	1.453	45	41.41
1.091	12	8.00	1.252	29	22.64	1.468	46	42.83
1.100	13	8.68	1.263	30	23.67	1.483	47	44.38
1.108	14	9.42	1.274	31	24.81	1.498	48	46.15
1.116	15	10.06	1.285	32	25.80	1.514	49	47.60
1.125	16	10.97	1.297	33	26.83	1.530	50	49.02
1.134	17	11.84	1.308	34	27.80			

GLAUBER'S SALT SOLUTIONS (SODIUM SULPHATE CRYSTALS)—SPECIFIC GRAVITY AT 19° C.

Specific Gravity.	Per cent. $Na_2SO_4 + 10H_2O$.	Na_2SO_4.
1.0040	1	0.441
1.0079	2	0.881
1.0118	3	1.323
1.0158	4	1.764
1.0198	5	2.205
1.0238	6	2.646
1.0278	7	3.087
1.0318	8	3.528
1.0358	9	3.969
1.0398	10	4.410
1.0439	11	4.851
1.0479	12	5.292
1.0520	13	5.373
1.0560	14	6.174
1.0601	15	6.615
1.0642	16	7.056
1.0683	17	7.497
1.0725	18	7.938
1.0766	19	8.379
1.0807	20	8.820
1.0849	21	9.261
1.0890	22	9.702
1.0931	23	10.143
1.0973	24	10.584
1.1015	25	11.025
1.1057	26	11.466
1.1100	27	11.907
1.1142	28	12.348
1.1184	29	12.789
1.1226	30	13.230

CHROMIUM ACETATE (GREEN) SOLUTION — SPECIFIC GRAVITY AND STRENGTH AT 15° C.

Specific Gravity.	Per cent. Cr_2O_3.	Specific Gravity.	Per cent. Cr_2O_3.
1.007	.5	1.084	6.00
1.014	1.00	1.091	6.50
1.021	1.50	1.098	7.00
1.028	2.00	1.105	7.50
1.035	2.50	1.112	8.00
1.042	3.00	1.119	8.50
1.049	3.50	1.126	9.00
1.056	4.00	1.133	9.50
1.063	4.50	1.140	10.00
1.070	5.00	1.147	10.50
1.077	5.50	1.151	10.70

CHROMIUM CHLORIDE SOLUTION — SPECIFIC GRAVITY AND STRENGTH AT 15° C.

Specific Gravity.	Per cent. Cr_2O_3.	Specific Gravity.	Per cent Cr_2O_3.
1.008	.5	1.148	9.0
1.016	1.00	1.164	10.00
1.032	2.00	1.180	11.00
1.048	3.00	1.197	12.00
1.065	4.00	1.213	13.00
1.082	5.00	1.229	14.00
1.098	6.00	1.245	15.00
1.115	7.00	1.261	16.00
1.131	8.00	1.276	17.00

Reference Tables

COMMON SALT SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. NaCl.	Specific Gravity.	Per cent. NaCl.
1.00725	1	1.10384	14
1.01450	2	1.11146	15
1.02174	3	1.11938	16
1.02899	4	1.12730	17
1.03624	5	1.13523	18
1.04366	6	1.14315	19
1.05108	7	1.15107	20
1.05851	8	1.15931	21
1.06593	9	1.16755	22
1.07335	10	1.17580	23
1.08097	11	1.18404	24
1.08859	12	1.19228	25
1.09622	13	1.20098	26

SODIUM BISULPHITE SOLUTIONS—SPECIFIC GRAVITY AND STRENGTH AT 15° C.

Specific Gravity.	Degrees Bé.	Per cent. $NaHSO_3$.	SO_2.
1.008	1	1.6	0.4
1.022	3	2.1	1.3
1.038	5	3.6	2.2
1.052	7	5.1	3.1
1.068	9	6.5	3.9
1.084	11	8.0	4.8
1.100	13	9.5	5.7
1.116	15	11.2	6.8
1.134	17	12.8	7.8
1.152	19	14.6	9.0
1.171	21	16.5	10.2
1.190	23	18.5	11.5
1.210	25	20.9	12.9

Specific Gravity.	Degrees Bé.	Per cent. $NaHSO_3$.	Per cent. SO_2.
1.230	27	23.5	14.5
1.252	29	25.9	15.9
1.275	31	28.9	17.8
1.298	33	31.7	19.6
1.321	35	34.7	22.5
1.345	37	38.0	23.6

SODIUM ACETATE SOLUTIONS—SPECIFIC GRAVITY AT 17.5° C.

Specific Gravity.	Per cent. $NaC_2H_3O_2$.	Per cent. $NaC_2H_3O_2 + 3H_2O$.
1.0150	3.015	5
1.0310	6.030	10
1.0470	9.045	15
1.0630	12.060	20
1.0795	15.075	25
1.0960	18.090	30
1.1130	21.105	35
1.1305	24.120	40
1.1485	27.135	45
1.1670	30.150	50

SULPHUROUS ACID—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. SO_2.	Specific Gravity.	Per cent. SO_2.
1.0028	0.5	1.0302	5.5
1.0056	1.0	1.0328	6.0
1.0085	1.5	1.0353	6.5
1.0113	2.0	1.0377	7.0
1.0141	2.5	1.0401	7.5
1.0168	3.0	1.0426	8.0
1.0194	3.5	1.0450	8.5
1.0221	4.0	1.0474	9.0
1.0248	4.5	1.0497	9.5
1.0275	5.0	1.0520	10.0

STANNIC CHLORIDE SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. $SnCl_4 + 5H_2O$.	Specific Gravity.	Per cent. $SnCl_4 + 5H_2O$
1.012	2	1.366	50
1.024	4	1.386	52
1.036	6	1.406	54
1.048	8	1.426	56
1.059	10	1.447	58
1.072	12	1.468	60
1.084	14	1.491	62
1.097	16	1.514	64
1.110	18	1.538	66
1.124	20	1.563	68
1.137	22	1.587	70
1.151	24	1.614	72
1.165	26	1.641	74
1.180	28	1.669	76
1.195	30	1.698	78
1.210	32	1.727	80
1.227	34	1.759	82
1.242	36	1.791	84
1.259	38	1.824	86
1.276	40	1.859	88
1.293	42	1.893	90
1.310	44	1.932	92
1.329	46	1.969	94
1.347	48	1.988	96

TANNIN SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity	Per cent.	Specific Gravity.	Per cent.
1.0040	1.0	1.0052	1.3
1.0044	1.1	1.0056	1.4
1.0048	1.2	1.0060	1.5

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.0064	1.6	1.0152	3.8
1.0068	1.7	1.0156	3.9
1.0072	1.8	1.0160	4.0
1.0076	1.9	1.0164	4.1
1.0080	2.0	1.0168	4.2
1.0084	2.1	1.0172	4.3
1.0088	2.2	1.0176	4.4
1.0092	2.3	1.0180	4.5
1.0096	2.4	1.0184	4.6
1.0100	2.5	1.0188	4.7
1.0104	2.6	1.0192	4.8
1.0108	2.7	1.0196	4.9
1.0112	2.8	1.0200	5.0
1.0116	2.9	1.0242	6.0
1.0120	3.0	1.0324	8.0
1.0124	3.1	1.0406	10.0
1.0128	3.2	1.0489	12.0
1.0132	3.3	1.0572	14.0
1.0136	3.4	1.0656	16.0
1.0140	3.5	1.0740	18.0
1.0144	3.6	1.0824	20.0
1.0148	3.7		

TARTARIC ACID SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.0045	1	1.0565	12
1.0090	2	1.0661	14
1.0179	4	1.0761	16
1.0273	6	1.0865	18
1.0371	8	1.0969	20
1.0469	10	1.1072	22

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.1175	24	1.2198	42
1.1282	26	1.2317	44
1.1393	28	1.2441	46
1.1505	30	1.2568	48
1.1615	32	1.2696	50
1.1726	34	1.2828	52
1.1840	36	1.2961	54
1.1959	38	1.3093	56
1.2078	40	1.3220	57.9

Saturated.

TIN CRYSTALS (STANNOUS CHLORIDE) SOLUTION—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. $SnCl_2 + 2H_2O$.	Specific Gravity.	Per cent. $SnCl_2 + 2H_2O$.
1.013	2	1.330	40
1.026	4	1.352	42
1.040	6	1.374	44
1.054	8	1.397	46
1.068	10	1.421	48
1.083	12	1.445	50
1.097	14	1.471	52
1.113	16	1.497	54
1.128	18	1.525	56
1.144	20	1.554	58
1.161	22	1.582	60
1.177	24	1.613	62
1.194	26	1.644	64
1.212	28	1.677	66
1.230	30	1.711	68
1.249	32	1.745	70
1.268	34	1.783	72
1.288	36	1.821	74
1.309	38	1.840	75

TARTAR EMETIC SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 17.5° C.

Specific Gravity.	Per cent. $SbOKC_4H_4O_6 + \frac{1}{2} H_2O$.	Specific Gravity.	Per cent. $SbOKC_4H_4O_6 + \frac{1}{2} H_2O$.
1.005	0.5	1.022	3.5
1.007	1.0	1.027	4.0
1.009	1.5	1.031	4.5
1.012	2.0	1.035	5.0
1.015	2.5	1.038	5.5
1.018	3.0	1.044	6.0

WATER ANALYSIS.

Analyses of water are sometimes reported as parts per million, and sometimes grains per imperial gallon, and sometimes grains per United States gallon. The following table gives all three values:

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
1	0.0700	0.0583	14	0.9800	0.8165
2	0.1400	0.1166	15	1.0500	0.8747
3	0.2100	0.1749	16	1.1200	0.9330
4	0.2800	0.2332	17	1.1900	0.9914
5	0.3500	0.2915	18	1.2600	1.0497
6	0.4200	0.3499	19	1.3300	1.1080
7	0.4900	0.4082	20	1.4000	1.1663
8	0.5600	0.4665	21	1.4700	1.2246
9	0.6300	0.5248	22	1.5400	1.2829
10	0.7000	0.5831	23	1.6100	1.3413
11	0.7700	0.6414	24	1.6800	1.3996
12	0.8400	0.6998	25	1.7500	1.4579
13	0.9100	0.7581	26	1.8200	1.5162

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
27	1.8900	1.5745	58	4.0600	3.3824
28	1.9600	1.6329	59	4.1300	3.4407
29	2.0300	1.6912	60	4.2000	3.4990
30	2.1000	1.7495	61	4.2700	3.5573
31	2.1700	1.8078	62	4.3400	3.6157
32	2.2400	1.8661	63	4.4100	3.6740
33	2.3100	1.9244	64	4.4800	3.7323
34	2.3800	1.9828	65	4.5500	3.7909
35	2.4500	2.0411	66	4.6200	3.8489
36	2.5200	2.0994	67	4.6900	3.9073
37	2.5900	2.1577	68	4.7600	3.9656
38	2.6600	2.2160	69	4.8300	4.0239
39	2.7300	2.2745	70	4.9000	4.0822
40	2.8000	2.3327	71	4.9700	4.1405
41	2.8700	2.3910	72	5.0400	4.1988
42	2.9400	2.4493	73	5.1100	4.2575
43	3.0100	2.5076	74	5.1800	4.3155
44	3.0800	2.5659	75	5.2500	4.3738
45	3.1500	2.6243	76	5.3200	4.4321
46	3.2200	2.6826	77	5.3900	4.4904
47	3.2900	2.7409	78	5.4600	4.5488
48	3.3600	2.7992	79	5.5300	4.6071
49	3.4300	2.8575	80	5.6000	4.6654
50	3.5000	2.9129	81	5.6700	4.7237
51	3.5700	2.9742	82	5.7400	4.7820
52	3.6400	3.0325	83	5.8100	4.8403
53	3.7100	3.0908	84	5.8800	4.8987
54	3.7800	3.1491	85	5.9500	4.9570
55	3.8500	3.2074	86	6.0200	5.0154
56	3.9200	3.2658	87	6.0900	5.0736
57	3.9900	3.3241	88	6.1600	5.1319

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
89	6.2300	5.1903	95	6.6500	5.5402
90	6.3000	5.2486	96	6.7200	5.5985
91	6.3700	5.3069	97	6.7900	5.6568
92	6.4400	5.3652	98	6.8600	5.7151
93	6.5100	5.4235	99	6.9300	5.7734
94	6.5800	5.4818	100	7.0000	5.8318

SYMBOLS AND ATOMIC WEIGHTS OF THE ELEMENTS.

Name.	Symbol.	Atomic Weight. H = 1.	O = 16.	Richards.	German.
Aluminum	Al	26.9	27.1	27.1	27.1
Antimony	Sb	119.3	120.2	120.0	120.
Argon	A	39.6	39.9	39.9?	40.
Arsenic	As	74.45	75.0	75.0	75.
Barium	Ba	136.4	137.40	137.43	137.4
Bismuth	Bi	206.9	208.5	208.0	208.5
Boron	B	10.9	11.0	10.95	11.
Bromine	Br	79.36	79.96	79.955	79.96
Cadmium	Cd	111.55	112.4	112.3	112.
Caesium	Cs	132.	133.	132.9	133.
Calcium	Ca	39.8	40.1	40.1	40.
Carbon	C	11.91	12.0	12.001	12.00
Cerium	Ce	139.	140.	140.	140.
Chlorine	Cl	35.18	35.45	35.455	35.45
Chromium	Cr	51.7	52.1	52.14	52.1
Cobalt	Co	58.55	59.00	59.00	59.
Columbium (Niobium)	Cb	93.3	94.	94.	94.
Copper	Cu	63.1	63.6	63.60	63.6
Erbium	Er	164.8	166.0	166.	166.

Name.	Symbol.	Atomic Weight.			
		H = 1.	O = 16.	Richards.	German.
Fluorine	F	18.9	19.05	19.05	19.
Gadolinium	Gd	155.	156.	156.	...
Gallium	Ga	69.5	70.0	70.0	70.
Germanium	Ge	71.9	72.5	72.5	72.
Glucinum (Beryllium)	Gl	9.0	9.1	9.1	9.1
Gold	Au	195.7	197.2	197.3	197.2
Helium	He	4.	4.	4.0?	4.
Hydrogen	H	1.000	1.008	1.0075	1.01
Indium	In	113.1	114.0	114.	114.
Iodine	I	125.90	126.85	126.85	126.85
Iridium	Ir	191.5	193.0	193.0	193.
Iron	Fe	55.46	55.88	56.0	56.
Krypton	Kr	81.2	81.8	.....	81.8
Lanthanum	La	137.9	138.9	138.5	138.
Lead	Pb	205.35	206.92	206.92	206.9
Lithium	Li	6.98	7.03	7.03	7.03
Magnesium	Mg	24.1	24.3	24.36	24.36
Manganese	Mn	54.6	55.0	55.02	55.
Mercury	Hg	198.50	200.0	200.0	200.3
Molybdenum	Mo	95.3	96.0	96.0	96.
Neodymium	Ne	142.5	143.6	143.6	144.
Neon		19.9	20.	.....	20.
Nickel	Ni	58.3	58.70	58.70	58.7
Nitrogen	N	13.93	14.04	14.045	14.04
Osmium	Os	189.6	191.0	190.8	191.
Oxygen	O	15.88	16.000	16.0000	16.00
Palladium	Pd	105.7	106.5	106.5	106.
Phosphorus	P	30.77	31.0	31.0	31.
Platinum	Pt	193.3	194.8	195.2	194.8
Potassium	K	38.86	39.15	39.140	39.15
Praseodymium	Pr	139.4	140.5	140.5	140.
Radium	Ra	223.3	225.	.....	....

Name.	Symbol.	Atomic Weight. H = 1.	O = 16.	Richards.	German.
Rhodium	Rh	102.2	103.0	103.0	103.
Rubidium	Rb	84.8	85.4	85.44	85.4
Ruthenium	Ru	100.9	101.7	101.7	101.7
Samarium	Sa	148.9	150.0	150.0	150.
Scandium	Sc	43.8	44.1	44.	44.1
Selenium	Se	78.6	79.2	79.2	79.1
Silicon	Si	28.2	28.4	28.4	28.4
Silver	Ag	107.12	107.93	107.930	107.93
Sodium	Na	22.88	23.05	23.050	23.05
Strontium	Sr	86.94	87.60	87.68	87.6
Sulphur	S	31.83	32.06	32.065	32.06
Tantalum	Ta	181.6	183.0	183.	183.
Tellurium	Te	126.6	127.6	127.5	127.
Terbium	Tb	158.8	160.	160.	....
Thallium	Tl	202.61	204.15	204.15	204.1
Thorium	Th	230.8	232.5	233.	232.
Thulium	Tm	169.7	171.0	170.	....
Tin	Sn	118.1	119.0	119.0	118.5
Titanium	Ti	47.7	48.10	48.17	48.1
Tungsten	W	182.6	184.	184.4	184.
Uranium	U	236.7	238.5	240.	239.5
Vanadium	V	50.8	51.2	51.4	51.2
Xenon	X	127.	128.	....	128.
Ytterbium	Yb	171.7	173.0	173.	173.
Yttrium	Yt	88.3	89.0	89.0	89.
Zinc	Zn	64.9	65.4	65.40	65.4
Zirconium	Zr	89.9	90.6	90.5	90.6

PART II

Eighth International Congress of Applied Chemistry

Eighth International Congress of Applied Chemistry

OPENING MEETING.

Washington, D. C., Wednesday, September 4, 1912.

The Other Meetings, Business and Scientific, in New York, Beginning Friday, September 6, 1912, and Ending Friday, September 13, 1912.

At the instance of the representatives of more than 4,000 American chemists, the Congress of the United States by Joint Resolution on March 4, 1909, authorized the President of the United States to invite the Eighth International Congress to meet in the United States. This invitation was extended to the Seventh International Congress in London, June 2, 1909, by the Honorable Whitelaw Reid, Ambassador from the United States to Great Britain, and enthusiastically and unanimously accepted.

The thirteen delegates sent by the Government of the United States to the Seventh Congress were appointed by that Congress as the nucleus of the Organizing Committee for the Eighth Congress, with power to add to their number.

On June 11, 1910, the gentlemen forming this nucleus met and organized for the despatch of business, and at a meeting held August 26, 1910, greatly increased the membership of the Organizing Committee. (A full list of the Organizing Committee

as it stands to-day, inclusive of the official representatives of the Governments of the various States, Territories, and Insular Possessions of the United States, and of the District of Columbia, is printed at pages 74 to 86.) These official representatives are primarily charged with the responsibility of seeing to it that none of the interests in their respective jurisdictions are overlooked at the Eighth Congress, and that all are properly represented thereat; they also serve as an official avenue of communication between their respective Governments and the Eighth Congress. This enlarged Organizing Committee, on October 8, 1910, provided for a Constitution and By-Laws (printed at page 53), and further provided for 25 scientific sections and subsections. One of these—on the leather industries—still remains to be organized if those interested in leather and allied manufactures desire to have a special subsection in the Eighth Congress. Sectional executive committees for each of the 24 sections and subsections have been organized. The task of completing the working committees (comprising a total of about 25 members each) for all of these 24 sections and subsections is going rapidly forward. (A list of the sections and subsections and their executive committees is given at pages 89 to 116.)

The responsibility for the conduct of the Eigth Congress is vested in the Executive Committee, the membership of which is printed at pages 74 and 75.

The responsibility for the conduct of business before the various sections and subsections at their sessions during the Congress is vested in a Committee on Sectional Procedure, which committee is composed of all the Presidents of sections and subsections, and tentatives rules have been framed. (See page 86.)

The Committees of Sections and Subsections, and particularly their respective Executive Committees, are charged with the responsibility of procuring papers for all their sessions, not only from chemists and others resident in the United States, but also from those resident in all other countries of the world. To the

end that the most effective co-operation may be secured, it is earnestly urged that, in all countries outside the United States, there be very soon formed committees of sections and subsections corresponding to those established in the United States, or so many of them as will provide fully for the interests of chemists and allied professional and business men in such countries as may not be interested in all the sections and subsections of the Eighth Congress, and that, upon organizing and announcement of such committees, all chemists and all chemical and allied societies resident in such country and interested in the Eighth Congress communicate with those of their committees in whose activities and purposes they are interested, giving the titles and scope of papers or other communications they may contemplate contributing to the Eighth Congress. (See also the tentative rules on papers and publications printed at page 58.) It is suggested that all such societies within or outside the United States, which desire to co-operate with any particular section or subsection of the Congress, communicate that fact to the President of the corresponding American Sectional Committees. It is further suggested that chairmen of committees of all sections and subsections outside the United States communicate, at stated intervals, preferably the first of every month, to the President of the American committees of the corresponding sections or subsections, the titles of papers or other communications promised, together with the names and post-office addresses of their authors, so that the American committee may be able to form an approximate estimate of the probable activities of the respective sections for the guidance of those responsible for the conduct of the Eighth Congress.

In order that there may be beneficial co-operation and a loose affiliation between the Eighth Congress and its sections and subsections on the one hand and other scientific or professional bodies meeting in or near New York or Washington at or about the time of the convening of the Eighth Congress, on

the other, a Committee on Co-operation has been established; this committee (see page 87) will be glad to communicate with any such associations in an endeavor to bring about such co-operation.

The President of the United States has shown his deep interest in the objects and purposes of the Eighth Congress by consenting not only to act as its patron, but also to preside at the opening meeting of the Eighth Congress, which is to be held in Washington, D. C., on Wednesday, September 4, 1912. The President of the United States has also shown his great solicitude for the success of the Eighth Congress by causing invitations to be sent to all the Governments of the world to take part in the deliberations and the work of the Congress. The chemists, individually, and collectively as societies, not only of the United States, but of all other countries of the world, therefore owe it not only to their science and to their profession to exert every effort to make the Eighth International Congress of Applied Chemistry completely successful, but they also owe it to their own countries and their own Governments to use every means in their power to see to it that every interest in their respective countries is properly and fully represented at the Eighth Congress and to demonstrate to their own Governments and their fellow-countrymen that, in accepting this invitation of the President of the United States, the confidence reposed in the chemists of the respective countries by their Governments has been fully justified. To this end the hearty and enthusiastic co-operation of chemists and allied professional and business men, and particularly of societies of chemists, and of allied professional and business societies the world over, and along the lines suggested at various places in this pamphlet, is most earnestly solicited.

It is hoped that all the matters presented in this pamphlet will be given the widest possible publicity in all chemical and allied societies, and in all chemical and allied publications the world over, and that suggestions for changes which may more

surely assist in the realization of a successful and profitable meeting may be made to the Executive Committee of the Eighth Congress.

Respectfully,

EIGHTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

EDWARD W. MORLEY, *Honorary President.*
WILLIAM H. NICHOLS, *President.*
BERNARD C. HESSE, *Secretary.*

NEW YORK, March 6, 1911.

CONSTITUTION AND BY-LAWS OF THE EIGHTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

1. The object of the Eighth International Congress of Applied Chemistry is the advancement of all applications of chemical science to practical life.

2. Any person having an interest in the object of this Congress is eligible to membership.

3. Applications for membership shall contain the applicant's declaration of desire to become a member; the applicant's name, title, post-office address and business or occupation shall be accurately set forth, and each application shall be accompanied by the membership fee, which is $5.00.

Application for and acceptance of membership in the Congress is an agreement to accept, observe, and abide by the By-Laws of this Congress. The membership ticket will entitle each member to the Congress badge and to participation in all the sessions and other functions of the Congress proper, to one copy of the daily journal of the Congress and to one copy of all the printed matter of the Congress, inclusive of the final Report of the Congress.

A membership card shall be accepted as sufficient identification during the Congress.

4. Tickets for ladies accompanying members can be obtained

for $3.00 each, and will entitle them to all the privileges of membership except active participation in the scientific and business sessions and receipt of the Proceedings of the Congress. Bearers of these tickets will be welcome at all social functions.

5. Members attending the Congress should register at the Central Registration Bureau as soon as possible after arrival in New York, and should indicate the sections or subsections in whose deliberations they propose to take part.

Each member has the right to vote upon all nominations and resolutions at the general sessions of the Congress, but he is entitled to participation in the debates and conferences of only those sections or subsections for which he has registered as above provided.

6. The number of the general sessions of the Congress, as well as the time and place of holding them and the order of business for each, shall be determined by the Executive Committee of the Congress and be announced by them in the daily journal not less than twenty-four hours preceding such general session.

The official languages of the Congress are English, German, French, and Italian.

7. There shall be the following committees:

1. Executive Committee,
2. Finance Committee,
3. Committee on Sectional Procedure,
4. Sectional Committees,
5. Committee on Papers and Publications,

and the Executive Committee shall have the power to appoint such additional committees as may be necessary for the orderly, proper, and expeditious conduct of the business of the Congress.

(*a*) The Executive Committee shall have immediate control of, and responsibilty for, the carrying out of all business of the Congress. The President of the Congress shall be Chairman of the Executive Committee and, with the Honorary President, shall decide and determine its size and personnel.

(*b*) The Finance Committee shall have charge of the collection and disbursement of all funds, and no bills shall be paid without the approval of the President of the Congress and the Chairman of the Committee incurring the outlay, or their duly appointed representatives. No indebtedness shall be incurred without the approval of the Executive Committee having first been obtained.

The Treasurer shall be Chairman of the Finance Committee, and with the Honorary President and the President shall determine the size and personnel of the Finance Committee.

(*c*) The Committee on Sectional Procedure shall decide the order of business and mode of procedure at all meetings of the sections and subsections of the Congress. Its decisions shall be final. This committee shall consist of all the Presidents of sections and subsections, who shall elect their Chairman, and any other necessary officer or officers from among their number.

(*d*) Each Sectional Committee shall have charge of all matters pertaining to the business of its section or subsection, and shall provide or procure all the papers for all the meetings of that section or subsection. The Sectional Executive Committee shall pass upon the fitness for presentation of all papers offered and also upon the order of business at each session; its decisions shall be final within the Committee.

The Sectional Committee shall consist of a President and a Vice-President, who shall be elected by the Organizing Committee; they shall select a Secretary and other members of their committee, subject to the approval of the Executive Committee.

The President and Vice-President of every Sectional Committee shall each select one member, who, with themselves and the Secretary of the section, shall constitute the Sectional Executive Committee.

The President and Vice-President of each section or subsection shall be responsible for the conduct of each stated meeting of their section or subsection.

The President of a section or subsection, or, in his absence,

the Vice-President, shall have power to designate Presidents of Honor for each session.

The Secretary of each section or subsection shall be responsible for the correct reporting of the transactions of each session of his section or subsection.

(*e*) The Committee on Papers and Publications shall receive from the Sectional Committees such papers as they recommend for publication and shall decide whether the same shall appear *in extenso* or in abbreviated form in the printed Report of the Congress. It shall also decide any appeal by the author from the decision of the Sectional Committee on the question of publication, and its action shall be final. This committee shall be appointed by the Executive Committee, but, as far as practicable, no member of the Executive Committee of a section or subsection shall be appointed thereon.

8. The minutes of each meeting, general or sectional, shall contain:

(*a*) The number of the session, the date, time, and place thereof, the name of the presiding officer and of the President or Presidents of Honor; also the number of persons in attendance.

(*b*) A list of all papers read and all reports given at the session in the order in which they were actually read, the name and address of those reading the papers, and also the names of all members participating in the discussion, together with their remarks or the substance of their remarks.

(*c*) Resolutions and conclusions when adopted.

9. Resolutions and conclusions of sections or subsections shall be adopted by a majority vote of those attending the last stated meeting of that section or subsection and at no other meeting. A proposed resolution or conclusion must be presented in writing to the Secretary of the Congress at least forty-eight hours prior to such last stated meeting, and it shall be his duty to print the same in the daily bulletins, provided, however, that pertinent written amendments to the printed form which do not affect the

substance of the proposed resolution may be adopted at such last meeting.

No resolution in which legislation is recommended to any particular Government shall be passed by the Congress or by any section or subsection thereof.

10. (*a*) The Executive Committee of the Congress is to decide and determine upon what addresses shall be given at the general sessions of the Congress, what motions and questions shall be put to the Congress in general meeting assembled, except as hereinafter provided; its decisions shall be final.

(*b*) Special addresses before sections or joint meetings of two or more sections, and the motions to be put before such joint meetings, shall be submitted to the Executive Committees of the sections holding such joint meeting, and their decisions shall be final.

11. The Executive Committee shall have power to decide all matters not touched upon in these provisions, and shall continue in existence until the work of the Eighth Congress is finished, and shall, prior to its disbandment, transmit all current business to the Organizing Committee of the Ninth Congress.

The time and place of the holding of the Ninth Congress and its Organizing Committee, which shall have power to add to its number, shall be determined at the last general session of the Congress.

12. A quorum in all sessions of the Congress or its committees of any kind shall be constituted by those who attend a stated meeting, and the majority vote of such quorum is conclusive, final, and binding.

The Honorary President and the President of the Ninth Congress shall be nominated by the International Commission of the Congresses of Applied Chemistry to the Eighth Congress at its last general meeting for election. The President of the Ninth Congress is to be Chairman of the Organizing Committee of that Congress.

RULES ON PAPERS, THEIR PRESENTATION, DISCUSSION, AND PUBLICATION.

In order that the objects of the Congress may be attained the following are necessary:

a. That as many as possible of the papers to be presented at the various meetings of the Congress and its various sections, be printed and distributed to members attending the Congress prior to the opening thereof.

b. That as little time be given to presentation as is consistent with adequate exposition of the salient points of the communication.

c. That as much time and opportunity be given for discussion as may be needed for a complete presentation of all the views of those members in attendance upon such discussion.

d. That the discussions be recorded in sufficiently full manner correctly to reflect the views of those taking part in the discussion.

e. That the Proceedings be published in complete form as soon after the close of the Congress as is at all feasible.

After considerable study, enquiry, and exhaustive criticism of the tentative rules submitted to the chemists and the chemical and similar societies of the world, March 6, 1911, and September 1, 1911, the Executive Committee of this Congress has concluded that hearty and earnest co-operation of all members of the Congress in the carrying out of the following rules will result in the practical realization of all these things; without such individual co-operation, the officers of the Congress can do very little toward such realization.

Duplicate copies of papers and their abstracts are *thoroughly essential* to quick and accurate printing; authors should have all their contributions in final form (see Rule 21).

1. Papers or other like contributions should be *original and not elsewhere read or published;* however, prior publica-

tion of Governmental researches, which publication is made in accordance with the law of such country, shall be exempt from the above restriction as to publication.

2. All papers or like contributions should be as *concise* as possible and must contain the name and post-office address of the respective authors; further, what number, if any, of reprints is desired. (See Rules 8 and 10.)
3. All papers should be *in duplicate* and legibly written, preferably typewritten; formulæ should be carefully inserted by hand as simply as possible.
4. Each sheet should be as nearly 8 by 12 inches as convenient and should be written on one side only, and *not* on both sides.
5. Each paper should be accompanied by an abstract thereof *in duplicate;* formulæ should be carefully inserted by hand, as simply as possible.
6. All references to other works should state carefully the sources of the citation, giving the exact reference to the original publication.
7. Illustrations, curves, and the like should be on separate smooth white sheets and drawn and lettered with Indian ink clearly enough to bear a linear reduction to one-half or two-thirds and when so reduced should not exceed the page size of the "Report," which will be about 4¼ by 7 inches.
8. Authors of papers which are to be illustrated by lantern slides are urgently requested to state on their paper the size of slide used so that suitable arrangements may be made. Failure to observe this may result in disappointment and delay. (See Rule 2.)
9. The Congress obligates itself to have its final Report and Proceedings, including subject and authors' index, completed and ready for distribution on or before December 31, 1912; in case those Reports and Proceedings be not ready for distribution by that date, authors of all papers

received and accepted *after* June 30, 1912, may then publish in any journal or publication that they may elect. (*Note:* This refers only to the Report and Proceedings bound in paper; members desiring cloth-bound sets can obtain them at an advanced charge over the $5.00 membership fee; such advanced charge will be announced later, but will probably be $2.50; delivery of these cloth-bound sets will be about 90 days later than of the paper-bound sets.)

Authors of papers received *before* the close of June 30, 1912, may publish those papers in any publication they may elect *after* the paper is read or *after* the Congress has adjourned. (See Rule 12.)

10. Authors of papers accepted and printed in full or in abstract will receive free of cost and all delivery charges, not to exceed fifty (50) reprints of each paper or abstract; additional copies of reprints can be had upon payment of the prices for such copies, which prices will be announced later. The Congress cannot undertake to furnish reprints of papers if the order for such reprints is not attached to the paper or abstract when received by the American Committee. (See Rule 2.)

11. Papers and their abstracts, *both in duplicate,* must be in the hands of the American Committee not later than June 30, 1912. All papers received *prior* to that time and accepted will be printed in their respective Sectional Volumes and distributed to such of the attending members of the Congress as may desire them, at or before the opening of the Congress. Papers received *after* that time, if accepted, will be printed, but may appear in an appendix which may or may not be ready by the opening of the Congress; the Congress cannot then undertake to print them along with the papers of those sections to which they may be assigned and which were received prior to June 30, 1912.

12. No paper offered to and accepted by this Congress can be at any time published elsewhere without giving credit to this Congress for such article or publication. However, Governmental publication of papers contributed to the Congress is exempt from the above requirement as to giving credit to this Congress.
13. All authors, as a matter of course, agree not to publish their accepted papers in any other publication except as herein provided, and, further, they agree to abide by any final decision of the Congress with respect to such paper or papers, their presentation, discussion, or printing.
14. Rejections by Sectional Committees will not be final; their decisions will be reviewed by the Committee on Papers and Publications, but rejection by that committee will be final.
15. Authors of finally rejected contributions will be notified in writing of such rejection immediately after it has been made, and, as far as the Congress is concerned, such final rejection is strictly secret and confidential. Rejected manuscripts are to be returned to their authors. (See Rule 16.)
16. The Congress will not publish a list of rejected papers nor state what papers have been rejected; directly after the closing of the Congress all records relating to rejected papers and like contributions will be destroyed; any and all proceedings as to rejected papers or like contributions, so far as the Congress is concerned, will be strictly secret and confidential.
17. Any paper which is of a pronounced polemical, advertising, or personal character may be thereby disqualified and for that reason alone rejected, regardless of whatever merit the paper may otherwise possess.
18. The Congress reserves the right to reject any paper or other contribution that may be offered to it.
19. The Congress reserves the right to print the full paper

only, or the abstract only, or the title only, in each case with the author's name and post-office address.

20. Authors are requested to state on the papers themselves their preferences for the sections in which they wish them to be read; the Congress will respect that request whereever practicable, but reserves the right to assign the paper to any other section that may be deemed more appropriate, and such disposition is final.

21. Authors will *not* receive printer's proofs of their papers or abstracts; nor will their papers or abstracts be revised after receipt by the American Committees; printing will be accurate to copy.

22. The time consumed in reading or presenting the substance of any paper by an author or his representative at a meeting of a section must not exceed ten (10) minutes, except by special permission of the Sectional Executive Committee.

23. In the absence of an author or his representative the paper will be read by title only, and if there be any discussion it must be based upon the paper as printed, because neither the paper itself nor its abstract will be read; exceptions to this rule can be made only under regulations that may be adopted by each Sectional Executive Committee.

24. Discussions of a pronounced polemical, advertising, or personal character may be ruled out by the Chair on that ground alone and not permitted to appear in the printed record; the ruling of the Chair in such matters is final and it not subject to revision or appeal.

25. Participants in discussions will be given an opportunity of editing the manuscript reports of their remarks, but printer's proofs will not necessarily be submitted to them, although wherever practicable they will be so supplied.

26. Participants in discussion must speak from the rostrum and *not* from the floor.

QUESTIONS DEALING WITH TOPICS OF INTERNATIONAL APPLICATION AND INTEREST WHICH HAVE BEEN REFERRED TO THE EIGHTH CONGRESS AND WHICH IT IS EXPECTED WILL BE FULLY REPORTED UPON AT THAT CONGRESS.

1. Report of the International Commission for the Unification of Methods of Food Analysis.
2. Unification of terms for reporting analytical results of soils, fertilizers, and ash.
3. The periodical revision of official methods for agricultural analyses.
4. Standardization of analytical methods to be applied to resins or resinous substances.
5. Definition of "volatile matter" as applied to the analysis of fuels.
6. Uniform principles to be applied to umpire or reference tests.
7. Standardization of tests for the stability of explosives.
8. The establishment of a central bureau for fermentation organisms.
9. Report of the Provision Committee on:
   (*a*) Greater uniformity in the commercial supplies of potent drugs and the means for determining the same.
   (*b*) Approximation in the pharmacopœias of the world to common standards of activity.
10. Report of the Committee on Physico-chemical Constants and Thermo-chemical Nomenclature.
11. Report of the Commission to make researches in collaboration with manufacturers of materials used in the ceramic arts, to encourage the use of substances not containing lead, to restrain the use of lead materials, and to conduct further researches with regard to protective materials for the hygienic use of those engaged in the ceramic industries.

12. Report on international conservation of natural resources.
13. Reports on the following questions:
    (*a*) Manufacture in one country of the International Convention for the Protection of Industrial Property, protects the patentee against revocation of his patent in all countries of the Convention.
    (*b*) International patents.
    (*c*) Uniform international patent and trade-mark legislation.
    (*d*) Patenting of pharmaceutical products.
    (*e*) Prior use within Convention States.
    (*f*) International depot de plis cachetes.

HOW TO OBTAIN MEMBERSHIP IN THIS CONGRESS.

Membership in this Congress is open to individuals, corporations, societies, associations, institutions and the like.

Persons contemplating membership in the Congress can obtain membership tickets from the Treasurer of the Congress, William J. Matheson, 182 Front Street, New York City, by forwarding to him an application for membership and the membership fee, which is $5.00. (See p. 53.)

For the convenience of those residing outside the United States, such membership tickets can also be obtained from:

PROF. M. O. FORSTER, *Treasurer*,
British Organizing Committee,
84 Cornwall Gardens,
London, S. W., England.

M. F. DUPONT, *Secretary*,
French Organizing Committee,
6 Place Malesherbes,
Paris, France.

DR. B. RASSOW, *Secretary,*
German Organizing Committee,
Stephanstrasse 8,
Leipzig, Germany.
PROF. ROSARIO SPALLINO, *Secretary,*
Italian Chemical Society,
Via Panisperna, 89 bis,
Rome, Italy.

These Treasurers will accept as the equivalent of $5.00 the following: £1; 25 francs; 20 marks; 25 lire.

The Treasurers' receipts issued by the above will be in English, French, German, and Italian, respectively, and all persons desiring to acquire membership are requested to correspond in whichever of the four languages above given that they prefer, and with the respective official above given.

Membership of Congress *Committees* does *not* constitute membership in the Congress.

LADIES' TICKETS.

On account of the relatively small number of ladies' tickets that will be required, they will be obtainable only through the Treasurer of the Congress, William J. Matheson, 182 Front Street, New York City. Applications for ladies' tickets, together with the fee therefor ($3.00, 12 shillings, 12 marks, 15 francs, or 15 lire, as the case may be) should be sent to the Treasurer at the above address, and the tickets will be forwarded to the address that may be given. The ladies' tickets sent will be in English unless French, German, or Italian tickets are asked for in the application.

ENTERTAINMENT OF LADIES.

The arrangements herefor are in the hands of the Ladies' Committee (page 87), and everything will be provided by them to insure the comfort, convenience, and entertainment of all ladies attending the Congress.

PROGRAMME OF THE MEETINGS OF THE EIGHTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

WEDNESDAY, SEPTEMBER 4:

Inaugural Meeting in Washington, presided over by the President of the United States.

FRIDAY, SEPTEMBER 6:

10 a. m. to 12 m.; 1 p. m. to 3 p. m. Sectional Meetings.*
4 p. m. General Lecture.†

SATURDAY, SEPTEMBER 7:

10 a. m. to 12 m. Sectional Meetings.

MONDAY, SEPTEMBER 9:

10 a. m. to 12 m.; 1 p. m. to 3 p. m. Sectional Meetings.
4 p. m. General Lecture.

TUESDAY, SEPTEMBER 10:

10 a. m. to 12 m.; 1 p. m. to 3 p. m.‡ Sectional Meetings.
4 p. m. General Lecture.

WEDNESDAY, SEPTEMBER 11:

10 a. m. to 12 m.; 1 p. m. to 3 p. m. Sectional Meetings.
4 p. m. General Lecture.

THURSDAY, SEPTEMBER 12:

10 a. m. to 12 m.; 1 p. m. to 3 p. m.§ Sectional Meetings.
4 p. m. General Lecture.

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* All Sectional Meetings will be held in Columbia University, New York City; joint meetings may be held elsewhere, but due and ample advance notice of such meeting-places will be made.

† The General Lectures will be held in the Great Hall of the College of the City of New York; they will be open to all members, their guests and to the invited public. The order of these General Lectures will be announced before September, 1912. Ample transportation facilities in addition to the regular facilities, if needed, both by the Subway and by the Third Avenue Railway (a surface line) will be provided so that members can reach the College of the City of New York from Columbia University in due time with a minimum of effort.

‡ This is the LAST Sectional Meeting at which resolutions which are intended to be put to the Congress at its meeting on Friday, September 13, can be introduced into any of the Sections; all resolutions must be offered in each of the four official languages, English, French, German and Italian.

§ At this meeting all resolutions which have been offered prior to and during the afternoon session of Tuesday, September 10, must be acted upon; no papers or other unfinished business, if any, can be taken up until all such resolutions have been finally disposed of by the Section.

FRIDAY, SEPTEMBER 13:

11 a. m. Final and Business Meeting of the Congress at the Great Hall of the College of the City of New York. Among the business to be despatched is:

1. Receiving the Secretary's Report on the work of this Congress.

2. Acting on the Resolutions submitted by the International Commission of Congresses of Applied Chemistry and the Executive Committee of this Congress.

3. Selecting the year and place of meeting of the Ninth International Congress of Applied Chemistry.

4. Electing the Honorary President and the President of the Ninth International Congress of Applied Chemistry.

The General Lecturers and the subjects of their lectures are as follows:

GEORGE M. BEILBY, of Glasgow, Scotland:
"Some Physical Aspects of Molecular Aggregation in Solids."

GABRIEL BERTRAND, of Paris, France:
"Des role des infiniment petites chimiques en chimie biologique."

CARL DUISBERG, of Elberfeld, Germany:
"The Latest Achievements and Problems of the Chemical Industry."

GIACOMO CIAMICIAN, of Bologna, Italy:
"La foto chimica dell 'avvenire."

IRA REMSEN, of Baltimore, Md., U. S. A.:
(Subject to be announced later.)

The entertainment programme is not sufficiently advanced to be announced; due and ample notice thereof will, however, be given.

Attention is also called to the following:

MONDAY, SEPTEMBER 2, 10 a. m.:

Business and closing meeting of the 1912 session of the Verein Deutscher Chemiker in Rumford Hall, Chemists' Club, 50 East 41st Street, New York City.

TUESDAY, SEPTEMBER 3, 10 a. m.:

Business and annual meeting of the Society of Chemical Industry in Rumford Hall, Chemists' Club, 50 East 41st Street, New York City.

WEDNESDAY AND THURSDAY, SEPTEMBER 4 AND 5:

After the Inaugural Meeting in Washington ample opportunity will be afforded for the inspection of the many and beautiful public buildings of the Federal Government and of its scientific establishments, such as the Bureau of Standards, Geological Survey, the various Bureaus of the Department of Agriculture, and many others. The social side of entertainment will be very fully provided for by the Washington Committee.

The meeting rooms of the sections will each be provided with facilities for lantern projections and most of them with facilities for experimental demonstrations of papers; in addition, at least two large lecture theatres, each equipped as completely and fully as any in the world for the public experimental demonstrations, with seating capacities of 365 and 300, respectively, are available. One of these lecture theatres is at Columbia University, the other at the College of the City of New York.

JOINT SESSIONS.

For Joint Sessions of sections ample facilities are at hand and these, as well as the sectional rooms, will be assigned as nearly suitable to requirements as it will be possible to forecast them, and as near in point of time to the meeting of the Congress as is compatible with safety. In this manner it is hoped that changes in appointed meeting places will be avoided and made unnecessary as far as foresight and careful inquiry can contribute to that end. The exact plan of the several meeting places cannot be made public until the opening of the Congress.

The following Joint Sessions have been tentatively announced to date:

(*a*) Analytical Chemistry with Pharmaceutical Chemistry; with Electrochemistry;

(*b*) Inorganic Chemistry, with Physical Chemistry, Electrochemistry, and Silicate Industries;

(*c*) Metallurgy and Mining with Electrochemistry;

(*d*) Fuels and Asphalt with Political Economy and Conservation of Natural Resources;

(*e*) Fats, Fatty Oils, and Soaps with Inorganic Chemistry and Paints, Drying Oils, and Varnishes;

(*f*) Starch, Cellulose, and Paper with Electrochemistry, Explosives and India Rubber and other plastics;

(*g*) Fermentation with Industry and Chemistry of Sugar and Starch, Cellulose, and Paper;

(*h*) Photochemistry with Paints, Drying Oils, and Varnishes;

(*i*) Electrochemistry with Inorganic Chemistry and Starch, Cellulose, and Paper;

(*j*) Electrochemistry with Inorganic Chemistry and Metallurgy and Mining;

(*k*) Electrochemistry with Inorganic Chemistry, Physical Chemistry, and Agricultural Chemistry.

Additional Joint Sessions will be provided when their desirability and feasibility appear.

The total number of papers promised to date is upward of 400, mostly by American chemists.

INTERNATIONAL COMMISSIONS.

These will make their reports to the Congress through those sections of the Congress with which they are most nearly allied.

PLACES OF MEETING IN NEW YORK.

The Congress has been most fortunate in having extended to it the hospitality of Columbia University which has placed at the disposal of this Congress whatever of its rooms and buildings may be necessary for the transaction of the business of this Congress, and of its sections, as more fully set out in the following pages. This results in a compact and close arrangement of the meeting rooms of the various sections, together with the

facilities necessary for the bringing about of speedy intercommunication among and between all the sections and their members.

For the general lectures and the general meetings of the Congress the College of the City of New York has most generously placed at the disposal of the Congress its Great Hall, having a seating capacity of 3,000 persons, and Professor Samuel A. Baldwin, Professor of Music at the College of the City of New York, has, at considerable personal sacrifice, consented to conduct appropriate organ recitals prior to each general lecture.

Columbia University is located on Morningside Heights, between Amsterdam Avenue and Broadway at 116th and 118th Streets; it can easily be reached from all points of the city by the use of the Subway to the 116th Street, *i.e.*, Columbia University, Station on the Broadway line, or the West Side elevated lines, from which latter, however, surface line transportation from 104th Street and Amsterdam Avenue or Broadway is recommended.

The College of the City of New York is located on Saint Nicholas Terrace, extending to Amsterdam Avenue from 137th Street to 140th Street, and is easily reached by Subway from all points of the City to 137th Street Station on the Broadway line, the West Side elevated lines to 140th Street, or by the Broadway surface lines.

Transportation facilities between Columbia University and the College of the City of New York are given by the Subway and the Third Avenue surface railway, the time by the former between stations being about five minutes and the time from 116th to 137th Street by the latter being about fifteen minutes.

Should all these facilities for meeting rooms and places prove inadequate, there are still available large halls and small rooms and fully equipped lecture theatres at the College of the City of New York, the College of Physicians and Surgeons, the American Museum of Natural History, the Camera Club, and Rumford Hall in the Chemists' Club.

GENERAL NOTICE.

The New York offices for:

1. Registration of attending members;
2. Distribution of such of the papers to be read at the Congress that are printed;
3. Distribution and sale of tickets;

will all be located in Columbia University Gymnasium; they will each be open from 9 a. m. to 5 p. m. on Tuesday, September 3, and every day thereafter excepting Sunday, September 8, up to and including Thursday, September 12.

Members and holders of ladies' tickets should always have their Congress tickets and badges with them, since admission to the various sectional meeting rooms may be rendered difficult if not impossible, without such ticket and badge.

Letters and telegrams, notes and parcels which are to be delivered to members while at Columbia University, must be directed to "Columbia University Gymnasium," otherwise delay, confusion, or loss may result.

The rooms assigned to sections in the buildings at Columbia University are intended for sectional business only; the reception room in Earl Hall is available as a general reception and conversation room and in that building every accommodation for the convenience of members will be found.

REGISTRATION.

All members in attendance at Columbia University are urged to register at the earliest possible moment; arrangements have been made to reduce the time required of each member in registering to a fraction of a minute; these arrangements will be interfered with most seriously unless members fill out *properly and legibly* the spaces indicated on the registration coupon of the Treasurer's Receipt for Membership Dues, before attempting to register; no person can register without surrendering such coupon properly and legibly filled out.

For the convenience of members who desire to register by mail, arrangements have been made that this can be done on and after September 3, *but not before;* the registration coupon *properly and legibly* filled out may be mailed to:

"Registration Bureau,
"Columbia University Gymnasium,
"New York City."

The things which members are to receive at registration will be forwarded by mail to the address given, but wholly at the member's risk of loss or misdirection.

Members are requested not to send their registration coupons by mail unless they are certain to be in attendance; otherwise confusion will result and the accuracy of the statistics of the Congress will be seriously impaired.

Ladies accompanying members are requested kindly to make use of the Ladies' Registration Bureau at Columbia University; they can likewise register by mail in the same manner as provided for members. Members may also register accompanying ladies at the same time and in the same manner that they themselves register.

A list of the daily registration of members and accompanying ladies will be printed daily and distributed to members at Columbia University Gymnasium *each* morning.

DISTRIBUTION OF PAPERS.

All papers received prior to June 30, 1912, and accepted on behalf of the Congress will be printed and ready for distribution to attending members on Tuesday morning, September 3, 1912.

In order to obtain these papers at that time, attending members must first register; upon registering they will receive, among other things, a ticket which each member must fill out *legibly and fully* at the places indicated and deposit in the box in Columbia University Gymnasium marked "Congress

Papers"; or it may be mailed as now to be described; if registration has been effected by mail, this ticket legibly and properly filled out may be mailed to

"Distributing Papers,
"Columbia University Gymnasium,
"New York City,"

and proper action will be taken thereon, but such forwarding of tickets for papers is wholly at the risk of the member so forwarding.

Under *no* circumstances will members be allowed to take part only of the papers ready for distribution at that time.

It is understood and agreed by all attending members who elect to have the papers above referred to distributed to them at or during the meeting of the Congress, that the papers so delivered are the *only* copies of those papers that they will receive. The Secretary of the Congress will forward after the close of the Congress to all such members at their last known address, all additional matter that may appear in the final report of the Congress.

It is further understood and agreed that none of the papers so distributed is released for publication anywhere until the paper is actually read at the Congress in full, in abstract, or by title, or until Friday, September 13, 1912, and that publication elsewhere is not permitted without credit to the Congress being given, the *only* exceptions hereto are Governmental publications.

Members electing not to have the above-referred-to papers distributed to them at the time of the Congress and wishing to have their copies of the final Report bound in cloth, can so have them by depositing with the Treasurer $2.50 (in addition to the membership fee already paid), and so indicating their desire on the ticket for papers above described which they will also leave with the Treasurer, either in person or by mail.

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HIS EXCELLENCY, THE PRESIDENT OF THE UNITED STATES.

INTERNATIONAL COMMISSION OF CONGRESSES OF APPLIED CHEMISTRY.

President.

WILLIAM H. NICHOLS.

Members.

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Sir WILLIAM RAMSAY, London.
Prof. E. PATERNO, Rome.
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Secretary.
BERNHARD C. HESSE, Ph.D.

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The American Chemical Society.

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The Secretary.
The Chairman of the divisions on
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Physical and Inorganic Chemistry.
Fertilizer Chemistry.
Agricultural and Food Chemistry.
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The Chairmen of the sections at
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Chicago,
New York,
Philadelphia,
Washington.

American Electrochemical Society.
The Past Presidents.
The President.
The Secretary.
The Chairmen of the sections at
New York,
Philadelphia.

The President, American Institute of Chemical Enigneers.
The President, American Institute of Electrical Engineers.
The President, American Pharmaceutical Association.
The President, American Philosophical Society.
The President, American Society for Pharmacology and Experimental Therapeutics.

American Society for Testing Materials.
The President.
The Secretary.

The Chemists' Club.
The President.
Three Delegates.

The President, College of the City of New York.
The President, Columbia University.
The President, Cosmos Club, Washington, D. C.
The President, Franklin Institute.
The President, Manufacturing Chemists' Association of the United States.
The President, Massachusetts Institute of Technology.
The President, National Academy of Sciences.
The Sanitary Superintendent, New York City Board of Health.
The Chancellor, New York University.
The President, Polytechnic Institute of Brooklyn.
The President, Pratt Institute.
The President, Stevens Institute.
Society of Chemical Industry.
The Past Presidents resident in the United States.
The Chairmen of the sections in
Boston and
New York.
The President, Society of Detroit Chemists.
The United States Brewers' Association.
The Secretary and
Two Delegates.
The Chairman, Verein Deutscher Chemiker, New York section.
The President, Western Association of Technical Chemists and Metallurgists.

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1. Report of the International Committee on Analysis.
2. General analytical procedures not relating to any particular industry.
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chloric acid, borates, phosphates, bromides, iodides, bromates, etc.
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Inorganic pigments—zinc oxide, white lead, vermilion, chromates, etc.
Artificial and synthetic inorganic preparations of all kinds; *e.g.*, peroxides, perborates, carbides.
Rare elements and their compounds—tungsten, molybdenum, vanadium, beryllium; rare earths; rare gases of atmosphere, etc.
Arsenical and other inorganic insecticides.
Chemical preparations in connection with artificial illumination—both mantle and flaming arc.
Inorganic solvents—water, liquid ammonia, liquid sulphur dioxide, carbon disulphide, carbon tetrachloride, etc.
Inorganic colloids and the ultramicroscope.
Plaster of Paris, lime burning, mortars, and cements.
Reports of the Laboratories of the National Geological Survey.
Reports of the Geophysical Laboratory.
Composition and structure of artificial mineral preparations.
Refractory products, magnesia cements, siloxicon linings, etc.
Technology of metallic elements and new alloys (all papers not dealing with the commercial production of the useful metals).
Technology of non-metallic elements, phosphorus, sulphur, nitrogen, chlorine, bromine, iodine, etc.
New apparatus for production and purification of inorganic preparations.
Air products, those involving important electrochemical applications in joint session with the section on electrochemistry.
Compressed and liquefied gases.

Theoretical papers dealing with inorganic problems should so far as possible be read in joint session with sections likely to be interested. The main problem attacked should, however, determine the section to which a paper is referred and the fact that electricity, the phase rule, the mass law, or other tool of the

science, is used in the solution of an inorganic problem should, in itself, be no more reason for placing it in another section than the presence of analytical results should define it as analytical chemistry.

SECTION IIIa.—METALLURGY AND MINING.

EXECUTIVE COMMITTEE.

President: JOSEPH W. RICHARDS, Ph.D., Lehigh University, South Bethlehem, Pa.

Vice-President: J. B. F. HERRESHOFF, Sc.D., Nichols Copper Co., General Chemical Co., 25 Broad Street, New York City.

Secretary: WALTER S. LANDIS, M.S., Lehigh University, South Bethlehem, Pa.

ARTHUR L. WALKER, M.A., Columbia University, New York City.

JAMES DOUGLAS, LL.D., Phelps, Dodge & Co. and El Paso and Southwestern Railroad Co., 99 John Street, New York City.

Business Address of Section IIIa: Lehigh University, South Bethlehem, Pa.

TOPICS OF SECTION IIIa.

1. Blast furnace practice.
2. Bessemer and open hearth practice.
3. Metallography.
4. Foundry practice.
5. Special steels.
6. Electrometallurgy.
7. Copper smelting.
8. Pyritic smelting.
9. Copper matte converting.
10. Copper refining.
11. Utilization of smelter smoke.
12. Roasting of ores.

13. Lead.
14. Lead fume.
15. Zinc.
16. Brass and bronze.
17. Bag filtration.
18. Electroplating, electrotyping, etc.
19. Electrometallurgical products.
20. Nickel.
21. Gold and silver.
22. Sodium, calcium, magnesium.
23. Boron, tungsten, molybdenum, etc.
24. Mining.

SECTION III*b*.—EXPLOSIVES.

EXECUTIVE COMMITTEE.

President: CHARLES E. MUNROE, Ph.D., George Washington University, Washington, D. C.

Vice-President: THOMAS M. CHATARD, Ph.D., LL.D., 1716 Rhode Island Avenue, Washington, D. C.

Secretary: WALTER O. SNELLING, Ph.D., Bureau of Mines, Pittsburg, Pa.

CHARLES L. REESE, Ph.D., E. I. du Pont de Nemours Powder Co., Wilmington, Del.

CHARLES F. MCKENNA, Ph.D., 50 Church Street, New York.

Business Address of Section III*b*: George Washington University, Washington, D. C.

TOPICS OF SECTION III*b*.

1. Composition or constitution.
2. Preparation or manufacture.
3. Storage and transportation.
4. Properties and uses.
5. Test methods and appliances.
6. Methods of analysis of explosives and of the components used in manufacture.

7. Rules, regulations, and laws governing the manufacture, storage, transportation, and use of explosives.
8. Accounts of accidental explosions and of precautions to be taken to prevent them.
9. Outrages committed with explosives and means for their suppression.

SECTION IIIc.—SILICATE INDUSTRIES.

EXECUTIVE COMMITTEE.

President: ALLERTON S. CUSHMAN, Ph.D., The Institute of Industrial Research, 804 Hibbs Building, Washington, D. C.

Vice-President: KARL LANGENBECK, K and First Streets, Boston, Mass.

Secretary: ZOLTAN DE HORVATH, 919 South St. Bernard Street, Philadelphia, Pa.

EDWARD ORTON, JR., E.M., the Ohio State University, 1538 North High Street, Columbus, Ohio.

HEINRICH RIES, Ph.D., Cornell University, Ithaca, N. Y.

Business Address of Section IIIc: 804 Hibbs Building, Washington, D. C.

TOPICS OF SECTION IIIc.

Chemistry and Technology of:

1. Hydraulic cements.
2. Ceramics—china, porcelain, etc.
3. Refractories and fireproofing.
4. Brick and tile.
5. Terra cottas.
6. Glass.
7. Stone products:
    (1) Building and construction.
    (2) Road materials.
8. Furnace slags and silicate wastes.
9. Quartz, feldspar, and mica industries.

SECTION IV.—ORGANIC CHEMISTRY.

EXECUTIVE COMMITTEE.

President: MARSTON T. BOGERT, LL.D., Columbia University, New York.

Vice-President: WILLIAM A. NOYES, Ph.D., LL.D., University of Illinois, Urbana, Ill.

Secretary: HARRY L. FISHER, A.M., Columbia University, New York.

F. D. DODGE, Ph.D., 291 Henry Street, Brooklyn, N. Y.

G. B. FRANKFORTER, Ph.D., University of Minnesota, Minneapolis, Minn.

Business Address of Section IV: Columbia University, New York.

TOPICS OF SECTION IV.

1. Manufacture of fine organic chemicals.
2. Organic acids (formic, acetic, lactic, oxalic, malic, tartaric, etc.).
3. Terpenes, camphors, and essential oils.
4. Perfumes and perfumery.
5. Tanning and leather.
6. Glue, size, gelatine, and colloids.
7. Bone distillation, bone oil, bone black.
8. Textiles.
9. Wood distillation products (acetic acid, wood alcohol, acetone, etc.).
10. Ethers, fruit ethers, and flavoring extracts.
11. Solvents and cleaning fluids (CCl_4, CS_2, etc.).
12. Miscellaneous (determination of structure, synthesis, etc., of organic compounds).

SECTION IV*a*.—COAL TAR COLORS AND DYESTUFFS.

EXECUTIVE COMMITTEE.

President: HERMAN A. METZ, H. A. Metz & Co., and Consolidated Color and Chemical Company, 122 Hudson Street, New York.

Vice-President: EUGENE MERZ, E.M., The Heller & Merz Company, Box 216, Newark, N. J.

Secretary: GUSTAV P. METZ, Ph.D., Consolidated Color and Chemical Company, Lister Avenue and Brown Street, Newark, N. J.

ADOLPH KUTTROFF, Badische Company, 128 Duane Street, New York.

J. F. SCHOELLKOPF, Schoellkopf, Hartford & Hanna Company, 499 Delaware Avenue, Buffalo, N. Y.

Business Address of Section IV*a:* 122 Hudson Street, New York.

TOPICS OF SECTION IV*a*.

Coal-Tar Colors—Manufacture of:

1. Analytical methods. (For instance, specifications for the determination of materials that have not completely entered into reaction during the process of manfacture, etc.)
2. Tests. (Qualitative tests applying to some special stages of a process, whereby the advancement or completion of a reaction can be determined, etc.)
3. New products.

Raw Materials and Intermediate Products used in the Manufacture of Dyestuffs—Manufacture of:

4. Analytical methods. (Specifications as above and methods of determining purity, etc., etc.)
5. Tests. (Qualitative tests as above.)
6. New products.

Natural Coloring Matter.

7. Dyewood extracts, mode of preparation, etc., etc.
8. Mineral pigments.

Dyeing.

9. Of all fibres, vegetable and animal.
10. Of all other materials, such as leather, wood, wood pulp, paper, paper pulp, straw, artificial silk, etc.

Printing.

11. Of textile fabrics.

Stains.

12. Water, spirit, oil soluble stains.

Pigments.

13. Dry colors and pulp colors.
14. Manufacture of, and their application in making lithographic printing inks, in wall paper printing, etc.

SECTION V*a*.—INDUSTRY AND CHEMISTRY OF SUGAR.

EXECUTIVE COMMITTEE.

President: W. D. HORNE, Ph.D., National Sugar Refining Company of New Jersey, Cuban-American Sugar Company, 175 Park Avenue, Yonkers, N. Y.

Vice-President: F. G. WIECHMANN, Ph.D., 39 West Thirty-eighth Street, New York.

Secretary: C. A. BROWNE, Ph.D., The New York Sugar Trade Laboratory, 80 South Street, New York.

A. HUGH BRYAN, M.S., Department of Agriculture, Washington, D. C.

FREDERICK BATES, A.M., Bureau of Standards, Washington, D. C.

Business Address of Section V*a*: 175 Park Avenue, Yonkers, N. Y.

TOPICS OF SECTION V*a*.

1. Raw cane sugar manufacture.
2. Raw beet sugar manufacture.
3. Maple sugar manufacture.
4. Sorgham sugar and syrup.
5. Milk sugar manufacture.
6. Sugar refining.
7. Candy.
8. Preserves.

9. Condensed milk.
10. Beet seed farming.
11. Honey and adulterants.

SECTION V*b*.—INDIA RUBBER AND OTHER PLASTICS.

EXECUTIVE COMMITTEE.

President: L. H. BAEKELAND, Sc.D., Yonkers, N. Y.

Vice-President: C. C. GOODRICH, 25 Broad Street, New York.

Secretary: JASPER E. CRANE, M.S., The Arlington Company, Arlington, N. J.

HAROLD VAN DER LINDE, Ph.D., Continental Rubber Company, 111 Broadway, New York.

D. SPENCE, Ph.D., The Diamond Rubber Company, Akron, Ohio.

Business Address of Section V*b*: Yonkers, N. Y.

TOPICS OF SECTION V*b*.

1. The section will include the chemistry of the production and utilization of rubber, gutta-percha, and substances having allied uses.
2. Plastic cellulose compounds, or compounds containing esters of cellulose; as, for instance, its nitrates, acetates, etc.
3. Synthetic and resinous plastics.
4. Casein and gelatine plastics.
5. Linoleum, oil cloth, artificial leather, artificial silk, and films for photographic and other purposes.

SECTION V*c*.—FUELS AND ASPHALT.

EXECUTIVE COMMITTEE.

President: DAVID T. DAY, Ph.D., United States Geological Survey, Washington, D. C.

Vice-President: F. SCHNIEWIND, Ph.D., The United Coke & Gas Company, 17 Battery Place, New York.

Secretary: EDWARD W. PARKER, United States Geological Survey, Washington, D. C.

ARTHUR H. ELLIOTT, Ph.D., The Consolidated Gas Company of New York, 165 Broadway, New York.

N. W. LORD, E.M., The Ohio State University, Columbus, Ohio.

Business Address of Section V*c:* United States Geological Survey, Washington, D. C.

TOPICS OF SECTION V*c*.

I.—ENERGY.

1. Light and illumination.
2. Heat.
3. Power.

II.—COMBUSTIBLES AND ILLUMINANTS.

Solid.

1. Bituminous coal and anthracite.
2. Briquettes.
3. Coke.
4. Peat.
5. Wood.
6. Miscellaneous solid combustibles and illuminants.

Liquid.

7. Petroleum.
8. Oil shale.
9. Alcohol.
10. Miscellaneous liquid combustibles and illuminants.

Gaseous.

11. Natural gas.
12. Town gas.
13. Producer gas and blue water gas.
14. Blast furnace gas.
15. Oil gas and vapors.
16. Acetylene.
17. Hydrogen, oxygen, etc.
18. Miscellaneous gaseous combustibles and illuminants.

III.—ASPHALT.

IV.—DESTRUCTIVE DISTILLATION.

1. Residues of destructive distillation (retort carbon, etc.).
2. Tar and tar oils.
3. Ammonia.
4. Cyanide.
5. Lampblack.
6. Other products of destructive distillation.

SECTION V*d*.—FATS, FATTY OILS, AND SOAPS.

EXECUTIVE COMMITTEE.

President: DAVID WESSON, S.B., the Southern Cotton Oil Co., 24 Broad Street, New York.

Vice-President: MARTIN H. ITTNER, Ph.D., Colgate & Co., Jersey City, N. J.

Secretary: L. M. TOLMAN, M.S., United States Department of Agriculture, Washington, D. C.

FRANK C. R. HEMINGWAY, Hemingway & Co., 133 Front Street, New York.

A. C. LANGMUIR, Ph.D., Marx & Rawolle, Brooklyn, N. Y.

Business Address of Section V*d:* 24 Broad Street, New York.

TOPICS OF SECTION V*d*.

1. *Fats, Oils, and Waxes*, as generally understood, or to state it another way, chemistry of the glycerides, with the exception of those used in paints and varnishes, and the chemistry of paints and varnishes.
2. *Sources.*
   Extraction and refining.
   Chemistry of.
   Saponification methods.
   Analytical methods.
   New products.

3. *Fatty Acids.*
   Candle manufacture, etc.
4. *Soaps.*
   Manufacture of.
   Properties of.
   Chemistry of.
   Soap-making material.
   Analytical methods.
5. *Glycerine.*
   Methods of recovery, refining, and purification.
6. *Essential Oils and Perfume Materials (Natural).*
   Preparation, properties, application, and analysis.

SECTION Ve.—PAINTS, DRYING OILS, AND VARNISHES.

EXECUTIVE COMMITTEE.

President: MAXIMILIAN TOCH, Toch Brothers, 320 Fifth Avenue, New York.

Vice-President: GUSTAVE W. THOMPSON, National Lead Co., 129 York Street, Brooklyn, N. Y.

Secretary: PARKER C. MCILHINEY, Ph.D., 7 East Forty-second Street, New York.

HENRY A. GARDNER, The Institute of Industrial Research, 804 Hibbs Building, Washington, D. C.

ALLEN ROGERS, Ph.D., Pratt Institute, Brooklyn, N. Y.

Business Address of Section V*e*: 320 Fifth Avenue, New York.

TOPICS OF SECTION V*e*.

1. Linseed oil.
2. Soya bean oil.
3. Fish oil.
4. China wood oil.
5. Perilla oil.
6. Turpentine.

7. Turpentine substitutes.
8. Solvents.
9. Dry colors.
10. Inorganic dry colors.
11. Organic dry colors.
12. Lead pigments.
13. Zinc pigments.
14. Earth pigments.
15. Mixed paints.
16. Varnishes.
17. Driers.

SECTION VI*a*.—STARCH, CELLULOSE, AND PAPER.

EXECUTIVE COMMITTEE.

President: A. D. LITTLE, Arthur D. Little, Inc., 93 Broad Street, Boston, Mass.

Vice-President: T. B. WAGNER, Ph.D., the Corn Products Refining Co., Heyworth Building, Chicago, Ill.

Secretary: C. C. MOORE, M.S., Bureau of Chemistry, Washington, D. C.

J. A. WESENER, M.D., the Columbus Laboratories, 103 State Street, Chicago, Ill.

H. S. MORK, B.S., Arthur D. Little, Inc., 93 Broad Street, Boston, Mass.

Business Address of Section VI*a:* 93 Broad Street, Boston, Mass.

TOPICS OF SECTION VI*a*.

1. Chemistry of starch.
2. Analytical methods for determinations of starch.
3. Hydrolysis of starch.
4. Modified starches, their properties and manufacture.
5. Glucose and grape sugar.
6. Dextrines, gums, and sizings.

7. By-products obtained in the manufacture of corn, wheat, potato, cassava, sago, tapioca, and other starches.
8. Treatment of trade wastes obtained in the manufacture of these starches.
9. Baking powders.
10. Flour and bread making.
11. Specific uses and application of starches.
12. Fibres.
13. Processes of fibre treatment.
14. New sources of paper stock.
15. Bleaching processes.
16. Pulp making.
17. Treatment of waste sulphite liquors.
18. Paper making.
19. Special fibre products.
20. Paper testing.
21. Deterioration of paper.
22. Textile sizes and finishes.
23. Mercerizing.
24. Twine and cordage.
25. Cellulose—chemical and physical properties.
26. Formation of cellulose in the plant.
27. Relation of properties of cellulose to plant structure.
28. Hydration of cellulose.
29. Hydrolysis of cellulose.
30. Decompositions of cellulose in nature.
31. Theory of cellulose molecule.
32. Esterification of cellulose.
33. Saponification of cellulose esters.
34. Cellulose acetates.
35. Cellulose formates.
36. Cellulose benzoates.
37. Viscose.
38. Action of cuprammonium on cellulose.
39. Action of zinc cholride on cellulose.

40. Action of sulphuric acid on cellulose.
41. Action of caustic soda on cellulose.
42. Lower nitrates of cellulose.
43. Celluloid.
44. Mixed esters of cellulose.
45. Cellulose films.
46. Artificial silk.
47. Artificial horsehair.
48. Artificial bristles.
49. Solvents for cellulose esters.
50. Timber treatment and preservation.
51. Wood distillation.
52. Oxy-cellulose and its formation.

SECTION VI*b*.—FERMENTATION.

EXECUTIVE COMMITTEE.

President: FRANCIS WYATT, Ph.D., the National Brewers' Academy of New York, 402 West Twenty-third Street, New York.

Vice-President: ROBERT WAHL, Ph.D., Wahl-Henius Institute of Fermentology, 1135 Fullerton Avenue, Chicago, Ill.

Secretary: EMIL SCHLICHTING, Ph.G., 402 West Twenty-third Street, New York.

LOUIS J. EHRET, 235 East Ninety-second Street, New York.

J. H. CARSTAIRS, Stewart Distilling Co., 254 South Third Street, Philadelphia, Pa.

Business Address of Section VI*b*: 402 West Twenty-third Street, New York.

TOPICS OF SECTION VI*b*.

1. All subjects connected with yeasts and yeast culture.
2. All subjects connected, directly or indirectly, with alcoholic fermentation, including enzymes.

3. All subjects bearing upon the application of chemistry to the industries of wine-making, alcohol distilling, cider-making, vinegar-making, brewing, and malting.

Section VII.—Agricultural Chemistry.

EXECUTIVE COMMITTEE.

President: Frank K. Cameron, Ph.D., Department of Agriculture, Washington, D. C.

Vice-President: H. J. Wheeler, Ph.D., Agricultural Experiment Station, Kingston, R. I.

Secretary: J. A. Le Clerc, Ph.D., United States Department of Agriculture, Washington, D. C.

L. L. Van Slyke, Ph.D., New York Agricultural Experiment Station, Geneva, N. Y.

H. P. Armsby, Ph.D., LL.D., the Pennsylvania State College, State College, Pa.

Business Address of Section VII: Bureau of Soils, United States Department of Agriculture, Washington, D. C.

TOPICS OF SECTION VII.

1. Chemistry, physics, and biology of soils, including inoculation, sterilization, nitrification, etc., alkali soils.
2. Chemistry and physics of soil solutions, drainage and seepage waters, irrigation waters, etc.
3. Chemistry of manures and fertilizers, including catalytic fertilizers, new fertilizers, utilization of atmospheric nitrogen.
4. Chemistry and physics of crops, root secretions, etc.
5. Chemistry and physics of nutrition.
6. Chemistry of feeding stuffs.
7. Chemistry of dairy products.
8. Chemistry of other agricultural products.
9. Chemistry of milling and baking.

SECTION VIIIa.—HYGIENE.

EXECUTIVE COMMITTEE.

President: W. P. MASON, M.D., LL.D., Rensselaer Polytechnic Institute, Troy, N. Y.

Vice-President: C. E. A. WINSLOW, M.S., College of the City of New York, New York.

Secretary: DANIEL D. JACKSON, M.S., Department of Water Supply, Gas, and Electricity, 13–21 Park Row, New York.

ROBERT S. WESTON, A.M., 14 Beacon Street, Boston, Mass.

LEVERETT MEARS, Ph.D., Williams College, Williamstown, Mass.

Business Address of Section VIIIa : Rensselaer Polytechnic Institute, Troy, N. Y.

TOPICS OF SECTION VIIIa.

1. Water.
2. Sewage.
3. Air.
4. Contamination and decomposition of food, but not adulteration.
5. Disinfection, covering use and testing of disinfectants.

SECTION VIIIb.—PHARMACEUTICAL CHEMISTRY.

EXECUTIVE COMMITTEE.

President: JOSEPH P. REMINGTON, Ph.M., 1832 Pine Street, Philadelphia, Pa.

Vice-President: V. COBLENTZ, Ph.D., E. R. Squibb & Sons, Brooklyn, N. Y.

Secretary: GEORGE D. ROSENGARTEN, Ph.D., Powers-Weightman-Rosengarten Co., P. O. Box 1625, Philadelphia, Pa.

ALBERT PLAUT, Lehn & Fink, 120 William Street, New York.

SAMUEL P. SADTLER, Ph.D., Philadelphia College of Pharmacy, 39 South Tenth Street, Philadelphia, Pa.

Business Address of Section VIII*b:* P. O. Box 1625, Philadelphia, Pa.

TOPICS OF SECTION VIII*b*.

1. Papers relative to the chemical standards of pharmacopœias.
2. Physical factors of chemical substances used for medicinal purposes.
3. All assay processes applied to organic and inorganic substances used in medicines.
4. Standardizations.
5. Statistical reports showing the uses of chemical substances in medicine.
6. Chemical nomenclature of medicinal substances.
7. Pharmacopœial purity rubrics.

SECTION VIII*c*.—BROMATOLOGY.

EXECUTIVE COMMITTEE.

President: W. D. BIGELOW, Ph.D., Department of Agriculture, Washington, D. C.

Vice-President: A. L. WINTON, Ph.D., United States Food Inspection Laboratory, Heisen Building, Chicago, Ill.

Secretary: E. M. CHAMOT, Ph.D., Cornell University, Ithaca, N. Y.

PAUL RUDNICK, Armour & Co., Chicago, Ill.

CHAS. D. WOODS, Sc.D., Director, Maine Experiment Station, Orono, Me.

Business Address of Section VIII*c:* Department of Agriculture, Washington, D. C.

TOPICS OF SECTION VIII*c*.

1. The composition of foods.
2. The analysis of foods, chemical, physical, microscopical, and bacteriological.

3. The adulteration and misbranding of foods.
4. The preparation, transportation, storage, preservation, deterioration, and sale of foods.
5. All questions relating to metabolism, nutrition, and diet.
6. The influence on nutrition and health of substances added to food intentionally or accidentally.
7. Cooking, including the composition of cooked food and the changes in composition produced by cooking.
8. Food factories, including questions relating to the manufacture of foods, the arrangement of factories, whether discussed from a technical, economic, or sanitary standpoint.
9. Cleanliness in the manufacture and handling of food.
10. Cooking utensils, with respect to their methods of manufacture and their effect on the composition of food.
11. Receptacles for the preservation of food (barrels, cans, bottles, etc.).

SECTION VIII*d*.—PHYSIOLOGICAL CHEMISTRY AND PHARMACOLOGY.

EXECUTIVE COMMITTEE.

President: JOHN J. ABEL, M.D., Johns Hopkins University, Baltimore, Md.

Vice-President: WILLIAM J. GIES, Ph.D., Columbia University, 437 West Fifty-ninth Street, New York.

Secretary: JOHN A. MANDEL, Sc.D., University and Bellevue Hospital Medical College, 338 East Twenty-sixth Street, New York.

REID HUNT, M.D., Ph.D., United States Public Health Service, Washington, D. C.

THOMAS B. OSBORNE, Sc.D., Ph.D., Connecticut Agricultural Experiment Station, New Haven, Conn.

Business Address of Section VIII*d:* Johns Hopkins Medical School, Baltimore, Md.

TOPICS OF SECTION VIII*d*.

As to the pharmacological topics that shall appear on the programme of our section, they should be both theoretical and practical in character.

From the theoretical point of view the mode of action of chemical and physical agents on living structures, healthy or diseased, should constitute a pharmacological programme of a sufficiently wide scope. The number of substances that have such interest is unlimited, and we shall hope to have offered us papers of a purely theoretical type, since the theory of to-day is the practice of to-morrow.

Problems of a more immediately practical nature will receive the attention naturally looked for in a congress of this nature, and papers that deal with the methods of standardizing or administering drugs, or with any of the numerous facts that have a bearing on their therapeutic uses, will be welcomed.

Questions of applied pharmacology that immediately concern the manufacturer, the chemist, or the physician offer subject-matter for papers.

The following is a partial list of topics to be considered, in which no sharp distinction is drawn between animals and plants; the subject of physiological chemistry being treated in its broadest aspect:

1. Chemical studies of protein substances, including polypeptides and prosthetic groups.
2. Carbohydrates, fats, phosphatides, sterines.
3. Inorganic substances.
4. Blood and lymph.
5. Toxins, antibodies, and questions pertaining to immunity so far as they concern biochemistry.
6. Muscle, brain, nerve, bone, integumentary structures.
7. Secretions and excretions in general.
8. The composition of various glands.
9. Coloring matters of biochemical or physiological significance.

10. The chemistry of digestion and nutrition.
11. Hormones, special glandular constituents, and special active agents not included in the above.
12. Studies in pathological chemistry.

Section IX.—Photochemistry.

EXECUTIVE COMMITTEE.

President: W. D. Bancroft, 7 East Avenue, Ithaca, N. Y.

Vice-President: R. James Wallace, Research Laboratory, G. Cramer Dry Plate Co., St. Louis, Mo.

Secretary: E. J. Wall, F.R.P.S., Fireproof Film Co., Rochester, N. Y.

F. A. Lidbury, Oldbury Electro-Chemical Co., Niagara Falls, N. Y.

Herbert E. Ives, National Electric Lamp Association, 4503 Hough Avenue, Cleveland, Ohio.

Business Address of Section IX: 7 East Avenue, Ithaca, N. Y.

TOPICS OF SECTION IX.

1. Photography.
2. Photochemistry.
3. Photometry.
4. Luminescence.

Section X*a*.—Electrochemistry.

EXECUTIVE COMMITTEE.

President: William H. Walker, Ph.D., Massachusetts Institute of Technology, Boston, Mass.

Vice-President: C. F. Burgess, B.S., University of Wisconsin, Madison, Wis.

Secretary: E. F. Roeber, Ph.D., *Metallurgical and Chemical Engineering*, 239 West Thirty-ninth Street, New York.

Jasper Whiting, S.B., The Whiting Co., 131 State Street, Boston, Mass.

Samuel A. Tucker, Ph.B., Columbia University, New York.
Business Address of Section X*a*: Massachusetts Institute of Technology, Boston, Mass.

TOPICS OF SECTION X*a*.

1. Coulometers or voltameters.
   (*a*) Silver and copper coulometers.
   (*b*) Water coulometers, etc.
2. Electrochemical analysis.
3. Electroplating.
   (*a*) Electrotyping.
   (*b*) Copper tubes, foil, and wire.
   (*c*) Nickel, copper, zinc, brass, silver, and gold plating.
4. Electrolytic winning and refining of metals in aqueous solution—copper, zinc, silver, etc.
5. Electrolysis of alkali chorides.
   (*a*) Production of hypochlorites and bleaching liquors.
   (*b*) Production of chlorates and perchlorates.
   (*c*) Production of chlorine and caustic alkali.
   (*d*) Electrolysis of water.
6. Primary cells—dry cells, etc.
7. Secondary cells—storage batteries, etc.
8. Electric furnace.
   (*a*) Materials of construction.
   (*b*) Design.
   (*c*) Method of operation, etc.
9. Products of the electric furnace.
   (*a*) Calcium carbide, carborundum, siloxicon, graphite, alundum, etc.
   (*b*) Phosphorus, carbon disulphide, etc.
   (*c*) Sodium and potassium, calcium, aluminum and silicon.
10. Electric furnace as applied to iron and steel.
   (*a*) Electrothermic reduction of iron ores.
   (*b*) Electrothermic refining of steel.

11. Fixation of atmospheric nitrogen.
    (*a*) Oxidation of nitrogen.
    (*b*) Absorption by calcium carbide.
12. Production and use of ozone.
13. Measuring instruments applicable to electrochemical work.
14. Electromotive force and thermodynamics.
15. Polarization.
16. Conductivity of fused electrolytes and non-metallic solids.

SECTION X*b*.—PHYSICAL CHEMISTRY.

EXECUTIVE COMMITTEE.

President: W. R. WHITNEY, Ph.D., General Electric Co., Schenectady, N. Y.

Vice-President: ALEXANDER .SMITH, Ph.D., University of Chicago, Chicago.

Secretary: ARTHUR B. LAMB, Ph.D., New York University, New York.

A. A. NOYES, Ph.D., Sc.D., LL.D., Massachusetts Institute of Technology, Boston, Mass.

G. A. HULETT, Ph.D., Princeton University, Princeton, N. J.

Business Address of Section X*b:* Schenectady, N. Y.

TOPICS OF SECTION X*b*.

1. Adsorption and absorption phenomena.
2. Apparatus.
3. Capillary phenomena.
4. Colloids and emulsions.
5. Applications of the phase rule, changes of state, etc.
6. Chemical theory in application.
7. Mathematical chemical application.
8. Thermodynamics.
9. Thermochemistry.
10. Immuno chemistry.

11. Catalysis.
12. Hydrolysis.
13. Physical chemical data.
14. Solubility.
15. Cryoscopic effects, etc.
16. Osmotic phenomena.
17. Diffusion.
18. Endosmose.
19. Luminous phenomena, phosphorescence, etc.
20. More purely physical properties, as viscosity, magnetic properties, compressibility, critical phenomena, vapor pressure phenomena, surface tension, etc.
21. Spectroscopy.
22. Metallography.
23. Commercial processes involving physical chemistry.
24. Radiochemistry.
25. Geophysical chemistry.
26. Chemical equilibria.
27. Gas reactions, etc.
28. Reaction velocity and chemical affinity.
29. Contributions to knowledge of ions, electrons, etc.
30. Electrical conductivity in gases.
31. High temperature measurements.

SECTION XI*a*.—LAW AND LEGISLATION AFFECTING CHEMICAL INDUSTRY.

EXECUTIVE COMMITTEE.

President: THE HONORABLE EDWARD D. WHITE, Chief Justice of the Supreme Court of the United States, Washington, D. C.

Vice-President: WM. L. DUDLEY, M.D., Vanderbilt University, Nashville, Tenn.

Secretary: JOHN C. PENNIE, 35 Nassau Street, New York.

FREDERICK P. FISH, A.B., 84 State Street, Boston, Mass.

ALFRED SPRINGER, Ph.D., Alex, Fries & Bro., Cincinnati, Ohio.

All communications for this section should be addressed to Professor Dudley.

Business Address of Section XI*a:* Nashville, Tenn.

TOPICS OF SECTION XI*a*.

1. Compulsory working of patented inventions.
2. Compulsory licensing of patented inventions.
3. Legislation affecting smoke and fume nuisances.
4. The chemical industry in its relation to the conservation of natural resources.
5. The chemical industry in its relation to pure food and drug legislation.
6. International regulation of the transportation of explosives, inflammables, and combustibles on merchant ships.

SECTION XI*b*.—POLITICAL ECONOMY AND CONSERVATION OF NATURAL RESOURCES.

EXECUTIVE COMMITTEE.

President : J. A. HOLMES, Sc.D., LL.D., Bureau of Mines, Washington, D. C.

Vice-President: C. R. VAN HISE, Ph.D., LL.D., University of Wisconsin, Madison, Wis.

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GIFFORD PINCHOT, Sc.D., LL.D., Washington, D. C.

EMORY R. JOHNSON, Ph.D., University of Pennsylvania, Philadelphia, Pa.

Business Address of Section XI*b:* Bureau of Mines, Washington, D. C.

TOPICS OF SECTION XI*b*.

1. Conservation of resources as an international problem: Why the nations should co-operate in this movement; how such co-operation can be brought about.

2. The need and practicability of making a world inventory of natural resources.
3. Existing law and needed changes in relation to conservation of resources, as indicating the rights and duties of the individual and of the State; with special reference to:
   (*a*) Mineral fuels (coal, petroleum, natural gas, etc).
   (*b*) Metalliferous resources.
   (*c*) Care of the soil.
   (*d*) Perpetuation of the forests.
   (*e*) Production and utilization of water powers.
   (*f*) Fisheries and other animal food supplies.
   (*g*) Insect pests and other injurious animals.
   (*h*) Conservation of animal life.
4. The world's fuel supply, its use and perpetuation.
5. The world's iron ore supply, and its perpetuation.
6. The world's supply of precious metals, and its perpetuation.
7. The world's supply of other metals, and its perpetuation.
8. The world's supply of mineral fertilizers, and its perpetuation.
9. The world's demand and supply of timber.
10. What different nations are doing in forest conservation.
11. The forest and timber situation in America.
12. What is being accomplished for conservation of resources through the introduction of electricity for power and transportation purposes.
13. Soil waste and soil improvement, as indicated by crop production in different countries.
14. Methods of maintaining and increasing productiveness of soils.
15. Results accomplished by irrigation, by the use of drought-resistant plants in arid and semi-arid lands.
16. What has been accomplished in different countries toward conserving the water supply:

(*a*) Through the construction of reservoirs.
(*b*) Through the improvement of forest conditions.
(*c*) Through the more efficient use of water:
1. For irrigation purposes.
2. For power purposes.

17. How can the growing menace to public health of stream pollution be reduced?
18. Increasing need of water supply for domestic use, and how this need is to be supplied.
19. The right and duty of every nation in the matter of conserving its water supply.
20. Conservation of resources through the prevention of preventable waste:

(*a*) In mineral resources.
(*b*) In timber resources.
(*c*) In water resources.
(*d*) In animal food products.
(*e*) In vegetable food products.
(*f*) In chemical industries.
(*g*) In other manufacturing industries.

PART III

Patents for the Year 1911

I. DYESTUFFS AND COLORING MATTERS
II. PROCESSES OF APPLICATION
III. CHEMICAL PROCESSES
IV. MACHINES
V. MISCELLANEOUS

Patents for the Year 1911

I.—DYESTUFFS AND COLORING MATTERS.

AZO TRIPHENYLMETHANE DYE.

Arthur Hausdörfer, of Elberfeld, and Carl Heidenreich, of Leverkusen, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 980,251, dated January 3, 1911.

The claim covers: 1. The new dyestuffs obtainable by reacting with diazo compounds of the triphenylmethane leuco compounds derived from an aminobenzaldehyde and an aromatic oxycarboxylic acid upon an azo dyestuff component and oxidizing the leuco compounds, which dyestuffs are in the shape of the free carboxylic acids, after being dried and pulverized red to black powders which are soluble in caustic soda lye with a reddish to violet color and which are soluble in concentrated sulphuric acid with a reddish color; yielding upon treatment with stannous chloride and hydrochloric acid a dyestuff of the triphenylmethane series derived from an aminobenzaldehyde and an aromatic oxycarboxylic acid and an amino compound; dyeing wool from acid baths yellow to red shades, green to dark violet to black shades fast to potting being obtained on chroming, substantially as described.

2. Specifically, the new dyestuff obtainable by reacting with the diazo compound of the triphenylmethane leuco compound derived from ortho-chloro-meta-amino-benzaldehyde and ortho-cresotinic acid upon ortho-cresotinic acid and oxidizing the leuco

compound, which dyes wool from acid baths yellow-brown shades which on being treated with bichromate change into a full yellowish-green fast to fulling, potting, and light.

AZO TRIPHENYLMETHANE DYE.

Arthur Hausdörfer, of Elberfeld, and Carl Heidenreich, of Leverkusen, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 980,521, dated January 3, 1911.

The present application relates to the production of a specific new azotriphenylmethane dyestuff which can be chromed after dyeing. The process for its production consists in condensing ortho-chloro-meta-aminobenzaldehyde with two molecules of ortho-cresotinic acid, diazotizing the resulting leuco compound, combining the diazo compound with 1-phenyl-3-methyl-5-pyrazolone and oxidizing the leuco-azo dyestuff.

The dye thus obtained dyes wool from acid baths yellow shades, green shades fast to potting being obtained on chroming.

AZO DYE.

Johannes Jansen and Wilhelm Neelmeier, of Leverkusen, near Cologne, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 981,276, dated January 10, 1911.

The invention relates to the manufacture and production of new azo coloring matters capable of dyeing on a mordant.

The new dyestuffs are obtained by combining the diazo compounds of such ortho-aminophenol derivatives which contain either nitro groups or halogens or both nitro groups and halogens but no sulphonic or carboxylic groups with diaminodiphenylether carboxylic acids.

The new products possess the valuable property that they can be dyed on wool together with bichromate in the same bath. They can also be dyed on a chrome mordant or according to the after-chroming method. The dyeing in one bath is best done by adding the dye with the bichromate to the bath, entering the

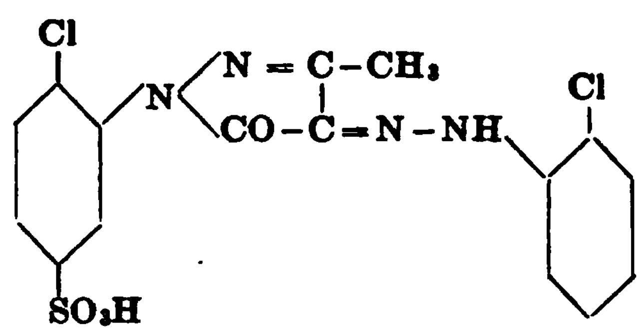
wool, boiling, adding acetic acid in small portions, and boiling again.

The claims specify the dyestuff obtained from 6-chloro-4-nitro-2-aminophenol and 2.4-diaminodiphenylether-4-carboxylic acid.

YELLOW PYRAZOLONE DYE FOR WOOL.

Hugo Geldermann, of Gross-Lichterfelde-Ost, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 982,050, dated January 17, 1911.

This invention relates to a new and very valuable dyestuff which dyes wool without a mordant from an acid bath clear and intense yellow tints of a very good fastness. This coloring matter contains pyrazolone nucleus and possesses the following constitution:



The new dyestuff may be produced by diazotizing ortho-chloroaniline and combining the diazo compound thus obtained with ortho-chloro-1-phenyl-3-methyl-5-pyrazolone-meta-sulphonic acid.

DYEING COMPOUND AND PROCESS OF PRODUCING THE SAME.

George S. Whitty, of New York, N. Y., assignor to F. W. Devoe & C. T. Reynolds Company. Patent No. 982,194, dated January 17, 1911.

The claims cover:

1. A dyeing compound in paste form consisting of coal tar dyes compounded with an accelerating agent, a vehicle or extender and water.

2. The process described of making a dyeing compound consisting in reducing coal tar dyes to dry powdered condition, reducing gum tragacanth to a pasty or dough-like consistency with water and mixing the powdered dye and an accelerating agent with the paste or dough into a homogeneous mass.

3. The process described of making a dyeing compound consisting in reducing coal tar dyes to dry powdered condition, reducing gum tragacanth to a pasty or dough-like consistency with water, mixing the powdered dye and an accelerating agent with the paste or dough into a homogeneous mass and drying the same into cakes or tablets.

DISAZO DYESTUFF.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to Corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 982,507, dated January 24, 1911.

This invention relates to the manufacture and production of a new disazo dyestuff, which can be obtained by combining the tetrazo compound of the toluylenediamine sulphonic acid

$$CH_3 : NH_2 : SO_3H : NH_2 = 1 : 2 : 4 : 6$$

with two molecules of the 2-amino-5-naphthol-7-sulphonic acid in acid solution. It dyes cotton orange shades, which after combination with diazotized para-nitraniline on the fibre change into Bordeaux shades fast to washing and leaving after being discharged a pure white.

DISAZO DYESTUFF.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to Corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 982,508, dated January 24, 1911.

This invention relates to the manufacture and production of new diazo dyestuffs, which can be obtained by combining the tetrazo compound of the toluylenediamine sulphonic acid

$$CH_3 : NH_2 : SO_3H : NH_2 = 1 : 2 : 4 : 6$$

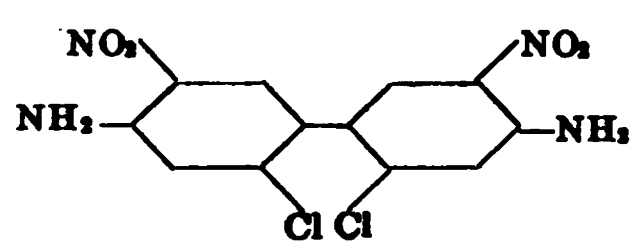
with one molecule of 2.8-amino-naphthol-6-sulphonic acid in acid solution and one molecule of a metadiamine or meta-aminophenol. These dyestuffs dye cotton reddish shades, which after combination with diazotized para-nitraniline on the fibre change into reddish-brown shades fast to washing and leaving after being discharged a pure white.

The claims specify the dyestuff obtained from meta-phenylene-diamine.

DISAZO DYESTUFF.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to Corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 982,509, dated January 24, 1911.

This invention relates to the production of a red disazo dyestuff consisting in combining with two molecules of beta-naphthol the tetrazo compound of dichlorodinitro-benzidine probably having the following constitution:



which can be obtained by nitration of the diacetyl compound of meta-meta′-dichloro-benzidine ($NH_2 : Cl = 1 : 3$) with nitric acid corresponding to two molecules and by splitting off the acidyl groups from the reaction product. The dyestuff is insoluble in water and advantageously used in the form of a paste; it is soluble in concentrated sulphuric acid with blue-red color. The dyestuff is completely insoluble in oil and can be used for the preparation of red pigment colors.

AZO DYE.

Oscar Günther and Leopold Hesse, of Elberfeld, and Arthur Zart, of Vohwinkel, Germany, assignors to Farbenfabriken vorm.

Friedr. Bayer & Co. Patent No. 982,952, dated January 31, 1911.

This invention relates to the preparation of new azo dyestuffs which are obtained by combining in alkaline or neutral solution the diazo compounds of unsulphonated nitroamines of the benzene series, especially, nitranilines and their derivatives—*e.g.*, 2-nitro-4-acetyl-paraphenylenediamine, 4-nitro-2-anisidine (OCH_3: NH_2: NO_2 = 1: 2: 4), 5-nitro-2-anisidine (OCH_3: NH_2: NO_2 = 1: 2: 5), 5-nitro-2-toluidine (CH_3: NH_2: NO_2 = 1: 2: 5), 2-chloro-4-nitraniline, nitro-anthranilic acids, 2.6-dibromo-4-nitraniline, etc., with substituted 2-amino-8-naphthol-6-sulphonic acids, especially 2-alkylamino-, 2-arylamino-, 2-aralkyl-amino-8-naphthol-6-sulphonic acids and their derivatives substituted in 1-position—*e.g.*, the 1.2-naphthimidazol-8-oxy-6-sulphonic acids, the 1.2-naphthothiazol-8-oxy-6-sulphonic acids, etc.

These dye wool in an acid bath shades ranging from red to black. The claims specify the product from nitroaminoanisol and 2-phenylamino-8-naphthol-6-sulphonic acid.

AZO DYE.

Oscar Günther and Leopold Hesse, of Elberfeld, and Arthur Zart, of Vohwinkel, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 982,953, dated January 31, 1911.

This invention relates to the preparation of new azo dyestuffs which are obtained by combining in acid solution the diazo compounds of unsulphonated nitroamines of the benzene series, especially ortho-, meta- and paranitranilines and their derivatives, *e.g.*, 2-nitro-4-acetyl-para-phenylenediamine, 4-nitro-2-anisidine, 4-nitro-2-toluidine, 2-chloro-4-nitraniline, nitro-anthranilic acids, 2.6-dibromo-4-nitraniline, meta-nitro-benzidine-oxaminic acid, etc., with 2-arylamino-8-naphthol-6-sulphonic acids.

The claims describe the azo dyestuff obtainable from 2.4-dinitraniline and 2-phenylamino-8-naphthol-6-sulphonic acid, which dyes wool black shades in an acid bath.

Patents for the Year 1911

AZO DYESTUFF.

Oscar Günther and Leopold Hesse, of Elberfeld, Arthur Zart, of Vohwinkel, and Hugo Schweitzer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 982,954, dated January 31, 1911.

This invention relates to the preparation of new azo dyestuffs which are obtained by combining in acid solution the diazo compounds of aromatic amines containing no nitro groups, especially aniline, ortho-chloroaniline, naphthylamines, toluidines, xylidines, aminophenol ethers, aminobenzaldehydes, anthranilic acids, etc., with 2-arylamino-8-naphthol-6-sulphonic acids.

The claims specify the azo dyestuff obtainable from orthochloroaniline and 2-para-anisidylamino-8-naphthol-6-sulphonic acid, which dyes wool bluish-red shades in an acid bath.

AZO DYE.

Oscar Günther and Leopold Hesse, of Elberfeld, Arthur Zart, of Vohwinkel, and Hugo Schweitzer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 982,955, dated January 31, 1911.

This invention relates to the preparation of new azo dyestuffs which are obtained by combining in acid solution the diazo compounds of aminosulphonic acids, such as sulphanilic acids, 2.5-dichloro-4-sulphanilic acid, 2-naphthylamine-3.6-disulphonic acid, sulphonic acids of toluidines, xylidines and aminophenol ethers with 2-arylamino-8-naphthol-6-sulphonic acids.

The claims specify the dyestuff obtainable from meta-sulphanilic acid and 2-meta-xylylamino-8-naphthol-6-sulphonic acid, which dyes wool red shades.

MONOAZO DYESTUFF FOR CHROME-MORDANTED WOOL.

Hugo Gelderman, of Gross-Lichterfelde-Ost, near Berlin, and Heinrich Oster, of Charlottenburg 2, Germany, assignors to

Action Gesellschaft für Anilin Fabrikation. Patent No. 983,-
11.
to the manufacture of a new monoazo
is to be used in combination with a
coloring matter produces in this way,
p and full red shade which possesses
re especially very fast to light.
btained by diazotizing a derivative of
cid of the following formula:

CO.CH_3: SO_3H = 1: 2: 4: 6

ompound thus obtained with 1-phenyl-

STUFF AND PROCESS OF KING SAME.

ich Eichwede, of Höchst-on-the-Main,
Farbwerke vorm. Meister Lucius &
,486, dated February 7, 1911.
33,280 of 1903 is described a monoazo
ining the diazotized 5-amino-2-chloro-
with β-naphthol. This dyestuff yields
red shade and of remarkable fastness
have now found, that by substituting
his dyestuff β-oxynaphthoic acid of
he β-naphthol, a product is obtained
properties than the dyestuff derived
a β-naphthol. In the first place, the
roduced from the new dyestuff has a
ly pure and bright. Furthermore, by
hthoic acid for the β-naphthol, the
uff to light is greatly enhanced, so
dyestuff constitutes a great technical
the combination described in U. S.

Patents for the Year 1911

MONOAZO DYE.

Erich Berthold, of Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 983,805, dated February 7, 1911.

The inventor has found that by diazotizing para-aminodiphenylamine and combining the diazo compound thus formed with resorcinol a new azo coloring matter is obtained which, because of its very remarkable fastness against the action of light, is very useful for several industrial purposes. For example, it may be used in the manufacture of color lakes for lithography, for wall-paper printing and for alcoholic varnishes; furthermore, this dyestuff is very well adapted for dyeing wood brown shades, which possess a very good fastness to light. The manufacture of such lakes and the dyeing of wood is performed in the manner usual for such purposes.

MONOAZO DYESTUFF AND PROCESS OF MAKING SAME.

Hugo Geldermann, of Gross-Lichterfelde-Ost, Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 984,900, dated February 21, 1911.

The present invention relates to improvements in the manufacture of yellow monoazo dyestuffs for wool and is based on the observation that by diazotizing para-chloraniline-meta-sulphonic acid and combining the diazo compound thus prepared with 1-phenyl-3-methyl-5-pyrazolone a very valuable dyestuff is obtained, which new coloring matter dyes wool from an acid bath containing sulphuric acid clear and intense yellow tints of a good fastness which are more especially very fast to light.

ANTHRAQUINONE VAT DYE.

Max Kugel, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co., of Elberfeld, Germany. Patent No. 985,352, dated February 28, 1911.

According to U. S. Patents Nos. 775,367, 775,368 and 775,369, amino- or alkylaminoanthraquinones containing halogen in ortho position can be easily converted into hydroazines (indanthrenes) by elimination of hydrogen halide. The inventor claims that by treating in the same way an equimolecular mixture of two different components, the resulting products do not consist, as might have been expected, of mixtures of different indanthrenes but are chemical individuals, which are produced by the combination of the two different molecules—*e.g.*, molecular quantities of 1-amino-2-bromo- and 1-methylamino-2-bromoanthraquinone yield monomethylindanthrene.

The new dyes are after being dried and pulverized blue powders soluble in boiling nitrobenzene with from a blue to blue-green color; soluble in concentrated sulphuric acid with from a yellowish-brown to green color; being transformed into hydro compounds on suitable reduction with hydrosulphite and caustic soda lye, the alkaline solution thus obtained exhibiting the typical properties of a "vat," which dyes the fibre pure blue to green-blue shades.

OXAZINE DYE.

Wilhelm Lommel, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 985,424, dated February 28, 1911.

The inventor has found that new dyestuffs of the oxazine series dyeing on a mordant can be obtained by condensing para-nitrosophenols with pyrogallol derivatives, especially gallic acid, gallic esters, gallaminic acid, gallanilide, pyrogallol sulphonic acid, etc. The new products are after being dried and pulverized brown to black powders soluble with difficulty in water, soluble in dilute caustic soda lye generally with a violet to brown color, furnishing from red-brown to violet chrome lakes on the fibre which are distinguished by a good fastness to washing and to chlorine. The leuco compounds of the new dyes can be produced by treating the dyes with reducing agents.

The claims specify the product from para-nitroso-phenol and gallaminic acid, which yields red-violet shades.

VAT DYE.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 985,767, dated March 7, 1911.

This invention relates to the manufacture and production of new and valuable vat dyestuffs. They are obtained by condensing monohalogenated beta-naphthisatine derivatives in which the oxygen of the alpha-beta group is replaced by easily movable or replaceable substituents—*e.g.*, halogen, sulphur, the amino group, the alkoxy group with phenolic compounds, especially 1-anthrol, 1-naphthol, 1.5- and 1.8-dioxyanthracenes and their substituted derivatives having a free ortho position to the hydroxy group.

The new dyes yield with hydrosulphite and caustic soda lye generally orange vats dyeing cotton after exposure to air blue-gray to black shades remarkable for their fastness to chlorine.

The claims specify the product obtainable from bromo-beta-naphthisatine-alpha-chloride and 1-anthrol.

VAT DYE.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 985,768, dated March 7, 1911.

This patent describes the manufacture of new and valuable vat dyestuffs. They are obtained by condensing beta-naphthisatine derivatives containing more than one halogen atom in which the oxygen of the alpha-keto group is replaced by easily movable or replaceable substituents—*e.g.*, halogen, sulphur, the amino group, the alkoxy group with phenolic compounds, especially 1-anthrol, 1-naphthol, 1.5- and 1.8-dioxyanthracenes and

their substituted derivatives having a free ortho position to the hydroxy group.

The new dyes yield with hydrosulphite and caustic soda lye generally orange vats dyeing cotton after exposure to air blue-gray to black shades remarkable for their fastness to chlorine.

The claims specify the dyestuff obtainable from dibromo-beta-naphthisatine-alpha-chloride and 1-anthrol.

VAT DYESTUFF.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 985,769, dated March 7, 1911.

This invention relates to the manufacture of new vat dyestuffs. They are obtained by condensing monohalogenated beta-naphthisatine derivatives in which the oxygen of the alpha-keto group is replaced by easily movable or replaceable substituents—*e.g.*, halogen, sulphur, the amino group, the alkoxy group with a para-substituted alpha-naphthol, especially 4-bromo-1-naphthol, 4-chloro-1-naphthol, 4-ethoxy-1-naphthol.

The new dyes yield with hydrosulphite and caustic soda lye generally yellow vats dyeing cotton after exposure to air bluish-gray to black shades remarkable for their fastness to chlorine.

The claims specify the dyestuff obtainable from bromo-beta-naphthisatine-alpha-chloride and 4-bromo-1-naphthol.

VAT DYESTUFF.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 985,770, dated March 7, 1911.

This patent describes the manufacture and production of new and valuable vat dyestuffs. They are obtained by condensing beta-naphthisatine derivatives containing more than one halogen atom in which the oxygen of the alpha-keto group is replaced by easily movable or replaceable substituents—*e.g.*, halogen, sul-

phur, the amino group, the alkoxy group with a para-substituted alpha-naphthol, especially 4-ethoxy-1-naphthol, 4-bromo-1-naphthol, 4-chloro-1-naphthol.

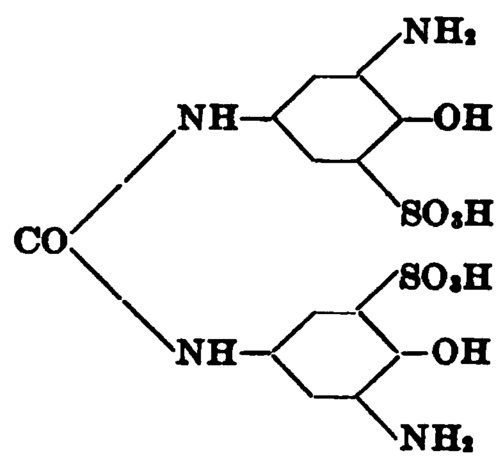
The new dyes yield with hydrosulphite and caustic soda lye generally yellow vats dyeing cotton after exposure to air blue-gray to black shades remarkable for their fastness to chlorine.

The claims specify the product obtainable from dibromo-beta-naphthisatine-alpha-chloride and 4-bromo-1-naphthol.

MONOAZO DYE FOR WOOL.

Wilhelm Herzberg and Oswald Scharfenberg, of Schöneberg, near Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 986,287, dated March 7, 1911.

This invention relates to a new monoazo dye for wool especially adapted to a subsequent treatment with oxidizing chromium compounds, which can be obtained by diazotizing the urea derivative of the following formula:



which derivative may be obtained for instance by acting with phosgene: $COCl_2$ upon 1.4-amidophenol-2-nitro-6-sulphonic acid and reducing the condensation product, and combining the resulting tetrazo compound with beta-naphthol. The dye thus obtained produces on wool from an acid bath brownish-red tints which by a subsequent treatment with potassium bichromate change to a black-violet possessing a great fastness to milling and potting besides an excellent fastness against the action of light.

YELLOWISH-RED VAT DYE.

Paul Thomaschewski and Heinrich Raeder, of Vohwinkel, and Walter Mieg and Paul Fischer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 986,-521, dated March 14, 1911.

This invention relates to the manufacture and production of a new vat dye of the anthracene series.

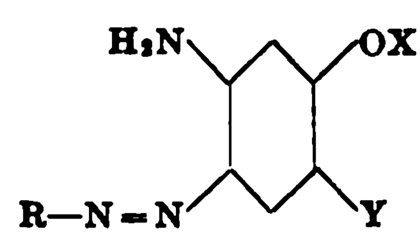
The process for its preparation consists in condensing 1-benzoylamino-6-chloroanthraquinone with 1-aminoanthraquinone.

The new product yields upon treatment with hydrosulphite and caustic soda lye an orange vat suitable for dyeing cotton fast yellowish-red shades.

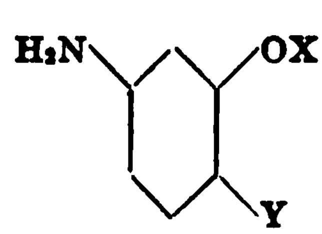
MONOAZO DYES FOR WOOL.

Wilhelm Herzberg, of Schöneberg, near Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 987,362, dated March 21, 1911.

According to this invention the hitherto unknown ortho-aminoazo bodies of the following general formula:



(R meaning an aryl- or alkaryl-group) can be obtained by combining a diazo compound with ortho-substituted meta-aminophenol ethers of the following general formula:



in which formula X signifies an alkyl group or the radical of acetic acid: CH_2COOH and Y signifies an alkyl group, an oxy-

alkyl group, an acidylamino group, a halogen, the sulphonic group and the like. In order to obtain the new azo dyes the combination of the diazo compound with the respective ortho-substituted meta-amidophenol ether is performed in acid solution, that is to say for example in the presence of acetic acid.

These new dyes are more especially adapted for dyeing wool in the presence of oxidizing chromium compounds; in this way are obtained olive tints which are very fast to milling and potting and possess a very great solidity against the action of light.

The claims specify the product from picramic acid and ortho-ethoxy-para-toluidine.

DIRECT-DYEING COTTON DYESTUFF.

Joseph Turner and Harry Dean, of Huddersfield, England. Patent No. 987,417, dated March 21, 1911.

This invention relates to the manufacture of direct-dyeing cotton dyestuffs, in investigating which we have found that ortho chlor aniline or para chlor analine or a mixture in any proportions of ortho chlor aniline and para chlor aniline is eminently suitable as a starting point for the preparation of dyestuffs, which dye vegetable fibres in deep black shades. If, for instance, according to our invention, amidonaphthol disulphonic acid H is combined with ortho-chlor diazo benzol or para chlor diazo benzol or a mixture of ortho chlor diazo benzol and para chlor diazo benzol in a solution slightly acid with mineral acid, a bluish-red azo dyestuff is produced which is capable of coupling further with diazo or tetrazo bodies in alkaline solution, and in the case of the tetrazo bodies the diazo group which remains free may be combined with amines or phenols producing black dyestuffs of great value.

In the production of a direct-dyeing cotton dyestuff according to our invention, we combine with one molecule of the neutral salt of amido naphthol disulphonic acid H, one molecule of ortho chlor diazo benzol or para chlor diazo benzol or of a mixture

of ortho chlor diazo benzol and para chlor diazo benzol, taking care that throughout the reaction a slight excess of mineral acid remains present. When the combination is completed, the color is made alkaline and a tetrazo solution from one molecule of benzidine is added, and subsequently one molecule of meta phenylene or meta toluylene diamine added. The coloring matter thus produced dyes vegetable fibres black shades of great beauty of tone.

PROCESS OF MAKING ORTHO-OXYMONOAZO DYE.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to Chemische Fabrik Griesheim-Elektron. Patent No. 987,999, dated March 28, 1911.

The inventor has discovered that a mordant azo dyestuff of remarkable fastness can be obtained by combining the diazotized nitroamino-salicylic acid

$$(OH: COOH: NO_2: NH_2 = 1: 2: 4: 6)$$

with para-cresol. The thus obtained dyestuff dyes wool from acid bath by subsequent treatment with chromates yellowish-brown shades of eminent fastness to light. The dyeing process and the treatment with chromates can be carried out in one bath at the same time.

SUBSTANTIVE DISAZO DYESTUFFS.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to Chemische Fabrik Griesheim-Elektron. Patent No. 988,000, dated March 28, 1911.

The inventor has discovered that new disazo dyestuffs dyeing cotton substantively, can be obtained by combining the tetrazo compounds of paradiamines in mineral acid solution with one molecular proportion of 1:8-aminonaphtholdisulphonic acids, containing the SO_3H group not in ortho position to OH and NH_2, and with one molecular proportion of a nitrometa-diamine of the benzene series. The thus obtained dyestuffs dye cotton brown

shades which, by subsequent treatment with diazotized para-nitraniline, are converted in olive-green ones of great coloring power and fastness to soaping. Among the 1: 8-aminonaphthol-disulphonic acids the 1: 8-aminonaphthol-3: 6-disulphonic acid, the 1: 8-aminonaphthol-4: 6-disulphonic acid and the 1: 8-amino-naphthol-3: 5-disulphonic acid are considered.

The claims specify the product obtained by combining the tetrazo compound of benzidine with one molecule of 1: 2-amino-naphthol-3:6-disulphonic acid and one molecule of nitro-meta-phenylenediamine.

YELLOW MONOAZO DYE AND PROCESS OF MAKING SAME.

Hugo Geldermann, of Gross-Lichterfelde-Ost, near Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 988,870, dated April 4, 1911.

The inventor has found that by diazotizing 2-chloroaniline and combining the diazo compound thus obtained with para-nitro-1-phenyl-3-methyl-5-pyrazolone, which is prepared for example by nitration of the 1-phenyl-3-methyl-5-pyrazolone, a new yellow monoazo dye is obtained. The new product is distinguished by a great fastness to light and is more especially adapted for the manufacture of color lakes, showing intense yellow tints of great fastness to light. In manufacturing such color lakes the dye may be mixed in the usual manner with a suitable lake substratum, such as hydrate of aluminium, zinc-white, blanc-fixe; but the lakes may also be produced in combining the formation of the dye with the manufacture of the lakes.

AZO DYESTUFF.

Oscar Günther and Leopold Hesse, of Elberfeld, and Arthur Zart, of Vohwinkel, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 989,000, dated April 11, 1911.

This invention relates to the preparation of a new azo dyestuff which is obtained by obtaining the diazo compound of 2.4-

dinitraniline in acid solution with 2-amino-8-naphthol-6-sulphonic acid.

The new dyestuff is after being dried and pulverized in the shape of its sodium salt a dark powder soluble in concentrated sulphuric acid with a yellowish-red color. Upon treatment with stannous chloride and hydrochloric acid the dye is split up, 1.2-4-triaminobenzene and 1.2-diamino-8-naphthol-6-sulphonic acid result. It is an acid dyeing color, producing on wool very level bluish-black shades of good fastness to fulling and to light and distinguished by their good resistance to the action of boiling mineral acids.

AZO DYESTUFF.

Oscar Günther and Leopold Hesse, of Elberfeld, and Arthur Zart, of Vohwinkel, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 989,001, dated April 11, 1911.

This invention relates to the preparation of new azo dyestuffs which are obtained by combining the diazo compound of 2.4-dinitraniline with sulphonic acids of aryl-beta-naphthylamines.

The new dyestuffs are after being dried and pulverized dark powders soluble in concentrated sulphuric acid generally with a red color; yielding upon reduction with stannous chloride and hydrochloric acid 1.2.4-triaminobenzene and a sulphonic acid of an amino-beta-arylnaphthylamine. They are acid dyeing colors, which produce on wool very level brown to black shades of good fastness to fulling and to light, distinguished by their good resistance to the action of boiling mineral acids.

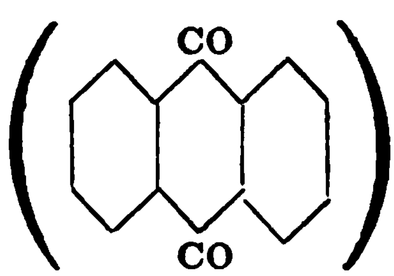
The claims specifically cover the product from beta-phenylnaphthylamine.

MANUFACTURE OF AMINO-ARYL-ACIDYL-AMINO-ANTHRAQUINONES AND THEIR ACIDYL DERIVATIVES.

Franz Henle, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 989,-602, dated April 18, 1911.

The inventor has found that hitherto unknown amino-aryl-acidyl-aminoanthraquinones are obtained by reducing the nitro-aryl-acidyl-aminoanthraquinones of the general formula: (anthraquinone) $NH.CO.R.NO_2$ (in which "R" represents an aromatic residue, such as phenyl, tolyl, anthraquinonyl) such as are, for instance, produced by condensing aminoanthraquinones and nitroarylic acid chlorides. The most valuable reducing agents are: hydrosulphite, or zinc dust, or iron and caustic soda lie. The said result of the reaction could not be foreseen, because, first of all, a saponification of the acidyl derivatives was to be expected.

The bodies obtainable by the present process have the composition



$NH.CO.R.NH_2$

(in which "R" represents any aromatic residue), and dye unmordanted cotton from the vat yellow to red tints. The shade and fastness of the dyeings thus obtained can be considerably improved by subjecting the above-described substances to the action of acidylating agents, particularly acid chlorides and acid anhydrides. In this manner the acidyl-amino-aryl-acidyl-aminoanthraquinones substituted in the amido group are obtained which generally form yellow-colored bodies of high melting point.

DYE.

Oskar Dressel, of Elberfeld, Richard Kothe, of Vohwinkel, and Alfred Thauss, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 989,953, dated April 18, 1911.

The claims cover:

1. The new dyestuffs obtainable by reacting with the diazo-

tized azo coloring matter obtainable from an aromatic amine and aminobenzenylthio-2.5-aminonaphthol-7-sulphonic acid upon a naphthol sulphonic acid, which dyestuffs are after being dried and pulverized in the shape of their alkaline salts, red to brownish-red powders soluble in concentrated sulphuric acid generally with a red coloration; dyeing cotton from red to bluish-red shades; and yielding upon reduction with stannous chloride and hydrochloric acid an amine, aminobenzenyl-thio-2.6-diamino-5-naphthol-7-sulphonic acid and an aminonaphthol sulphonic acid.

2. The new dyestuff obtainable by reacting with the diazotized azo coloring matter obtainable from diazotized ortho-toluidine and meta-aminobenzenylthio-2.5-aminonaphthol-7-sulphonic acid upon 1-naphthol-4-sulphonic acid, which dyestuff is after being dried and pulverized in the shape of its sodium salt a reddish-brown powder; soluble in water with a red coloration; soluble in concentrated sulphuric acid with a red coloration; yielding upon reduction with stannous chloride and hydrochloric acid ortho-toluidine, meta-aminobenzenylthio-2.6-diamino-5-naphthol-7-sulphonic acid and 2-amino-1-naphthol-4-sulphonic acid; and dyeing cotton pure yellowish-red shades.

DYE.

Oscar Dressel, of Elberfeld, and Richard Kothe, and Heinrich Hoerlein, of Vohwinkel, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer Co. Patent No. 989,954, dated April 18, 1911.

This invention relates to the manufacture of new azo dyestuffs suitable for dyeing wool which are obtained by combining the diazo compounds of aminoarylsulphonamides with naphthol sulphonic acids. The new dyestuffs are after being dried and pulverized in the shape of their alkaline salts from orange to reddish-brown powders soluble in water and in concentrated sulphuric acid with from an orange to red color; yielding upon reduction with stannous chloride and hydrochloric acid an aminoarylsulphonamide and an aminonaphthol sulphonic acid.

They dye wool from orange to red shades which are remarkable for their excellent fastness to milling, washing, and light.

The claims specify the new dyestuff obtainable by reacting upon 2-naphthol-6-sulphonic acid with diazotized 4-toluidine-2-sulphonanilide, which dyes wool in an acid bath brilliant orange shades.

FLUORESCEÏNE DYESTUFF AND PROCESS OF MAKING SAME.

Arnold Brunner, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 990,-224, dated April 25, 1911.

Fluoresceïnes chlorinated in the resorcinol nucleus, as obtained, for instance, by the action of chlorine upon fluoresceïnes, or by combination of chlororesorcinol with phthalic acids, are not capable of receiving any further quantity of chlorine without the dyestuffs being thereby destroyed. However, it is now found that bromine and iodine can still be introduced into such chlorofluoresceïnes. Thus, new dyestuffs of great value are obtained, which, on the one hand, are distinguished from the parent products by their much more intense blue and brighter tint; on the other hand, very much resemble the corresponding dyestuffs containing only iodine or bromine, so that it is possible, without impairing their tinctorial power, partly to substitute the chlorine, which is cheaper in price, for the more expensive halogens.

MORDANT-DYEING AZO DYES AND PROCESS OF MAKING SAME.

Bernhard Richard, of Basel, Switzerland assignor to the Aniline Color and Extract Works, formerly John R. Geigy. Patent No. 991,750, dated May 9, 1911.

This invention relates to certain new and useful improvements in coloring matters and to the methods of preparing the same and has for its object the preparation of coloring matters by

combining diazo-p-nitraniline-o-sulphonic acid with oxy-carboxylic acids of the benzene series.

The known azo coloring matter obtained from p-nitraniline and salicylic acid besides being difficult to dissolve, which renders it unsuitable for many purposes, has the further disadvantage that it produces dyeings that are not fast to milling and potting. It is now found that coloring matters can be obtained from p-nitraniline-o-sulphonic acid and salicylic acid, as well as its homologues, which do not possess these advantages.

While the diazo-p-nitraniline-o-sulphonic acid is easily decomposed and rendered unsuitable for combining with the oxy-carboxylic acids of the benzene series, diazo-p-nitraniline-o-sulphonic acid can be combined with oxy-carboxylic acids of the benzene series in the presence of non-decomposing substances, a number of which do not destroy or seriously impair the diazo-p-nitraniline-o-sulphonic acid. Among these non-decomposing substances which can be employed are weak alkaline solutions; or the oxides of magnesium, zinc or the alkaline earths or hydroxides of the same. The inventor has further discovered that even strong alkaline solutions may be employed as non-decomposing substances when combining diazo-p-nitraniline-o-sulphonic acid with a meta compound of oxy-carboxylic acid of the behzene series, such as m-cresotinic acid.

ANTHRACENE DYE.

Max Albert Kunz, of Mannheim, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 992,567, dated May 16, 1911.

This invention relates to new coloring matters of the anthracene series which are methyl derivatives of N-dihydro-anthraquinone-azine (indanthrene blue) containing one or more methyl groups attached to carbon atoms of the anthracene residues.

These coloring matters can be produced by applying any of the methods which are employed for the production of indanthrene blue itself to the corresponding methylated initial mate-

rials, namely by melting 2-amino-methyl-anthraquinone with caustic potash and oxidizing the leuco compound thus formed (cf. U. S. Patent No. 682,523), or by treating 2-amino-methyl-anthraquinone with an oxidizing agent (cf. U. S. Patent No. 739,145), or by treating 1-amino-methyl-anthraquinone with an acid agent or a metallic salt (cf. U. S. Patent No. 855,248). Other methods of producing indanthrene blue or halogenated products thereof consist in treating 1-amino-2-halogen-anthraquinone or 2-amino-1.3-dihalogen-anthraquinone with a suitable condensation agent (cf. British Patent No. 7692/04) and in condensing an ortho-diamino-anthraquinone with an ortho-dihydroxy-anthraquinone (cf. British Patent No. 9102/06), and these processes can also be applied to methyl substituted initial materials.

The claims specify 3.3′-dimethyl-indanthrene blue, which dyes cotton blue shades from a hydrosulphite vat.

AZO DYE.

Karl Brenzinger, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 993,020, dated May 23, 1911.

It has been found that the diazo compound of the benzylated azimino-ortho-toluidine can be combined with 2-arylamino-8-naphthol-6-sulphonic acid. The dye thus obtained is after being dried and pulverized a brown-black powder soluble in hot water. On being treated with stannous chloride and hydrochloric acid it is split up into benzyl-azimino-ortho-toluidine and amino-2-aryl-amino-8-naphthol-6-sulphonic acid and dyes wool from acid baths brown shades, which after treatment with chromium compounds are fast to milling.

AZO DYE.

Heinrich Jordan and Wilhelm Neelmeier, of Leverkusen, near Cologne, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 993,073, dated May 23, 1911.

The process for the production of these new dyestuffs con-

sists in combining diazo compounds of aromatic amines, such as aniline, anisidine, toluidine, xylidine, cresidine, aminophenols, naphthylamines, naphthylamine sulphonic acids, etc., with aminobenzoylaminobenzoly-2-amino-5-naphthol-7-sulphonic acids.

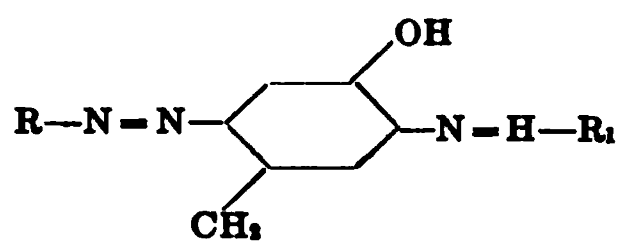
The new dyes are soluble in water and produce on cotton orange-red to bluish-red shades of great purity and of excellent fastness to light. They can be diazotized on the fibre and combined with developers—*e.g.*, betanaphthol, shades fast to washing being thus obtained.

The claims specify the dyestuff obtained from diazobenzene and meta-aminobenzoyl-meta-aminobenzoyl-2-amino-5-naphthol-7-sulphonic acid.

AZO DYE AND PROCESS OF MAKING SAME.

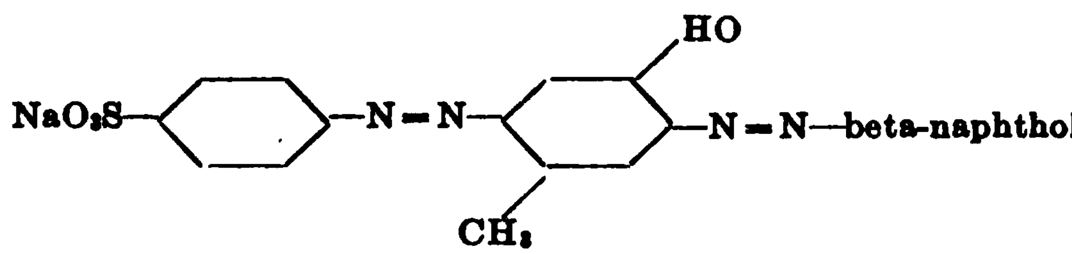
Bernhard Richard, of Basel, Switzerland, assignor to the Aniline Color and Extract Works, formerly John R. Geigy. Patent No. 993,549, dated May 30, 1911.

The invention relates to the manufacture of new ortho-oxy-disazo coloring matters of the type



in which R represents the residue of an aromatic sulphonic or carboxylic acid or a derivative or substitution product, and R_1 represents the radical of an azo coloring matter component. These coloring matters, dyeing wool from acid bath after subsequent treatment with a chromate in different shades ranging from green to brown and black, are distinguished by an extreme fastness to the action of light and the processes of milling and potting. They are obtained by diazotizing certain para-amino-metaoxy-azo coloring matters, and combining the thus obtained diazo-azo compounds under suitable conditions with azo coloring matter components.

The claims specify the dyestuff of the formula:



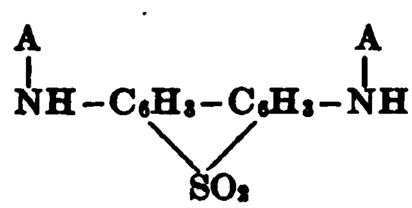
which dyes wool a claret color in acid bath, said claret color changing by an after-treatment with bichromate to a bluish-green color fast to light, potting, and milling.

VAT DYE.

Paul Thomaschewski, of Vohwinkel, near Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 993,735, dated May 30, 1911.

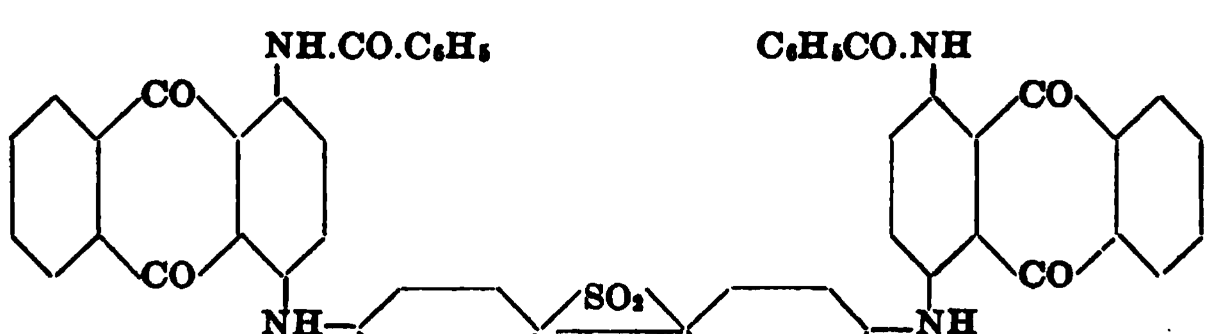
The present invention concerns the manufacture and production of new vat dyes which can be obtained by condensing polyhalogenated diarylsulphones with at least two molecules of an aminoanthraquinone.

The new dyes having probably the following general formula:



in which A means an anthraquinone.

The claims specify the new dye obtainable from para-para[1]-dichlorodiphenylsulphone and two molecules of 1-monobenzoyl-amino-4-aminoanthraquinone,



which dyes cotton from the hydrosulphite vat dark-green shades fast to boiling, light, and chlorine.

VAT DYE.

Paul Thomaschewski, of Vohwinkel, near Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 993,736, dated May 30, 1911.

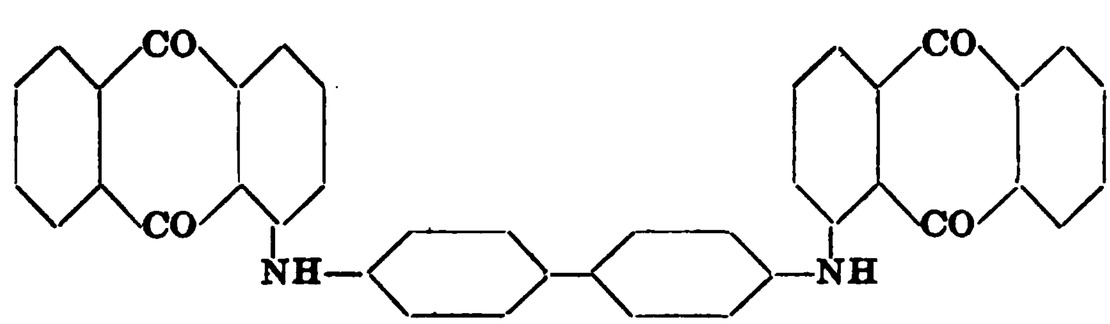
The present invention concerns the manufacture and production of new vat dyes which can be obtained by condensing polyhalogenated diaryl-compounds, especially dichlorodiphenyls, dichloro-dimethyldiphenyls, with at least two molecules of an aminoanthraquinone.

The new dyes have probably the following general formula:

$$\begin{array}{ccccccc} A & & & & & & A \\ | & & & & & & | \\ NH & - & C_6H_3 & - & C_6H_3 & - & NH \\ & & | & & | & & \\ & & R & & R & & \end{array}$$

in which A means an anthraquinone substance and R an atom of hydrogen which may be substituted by alkyl groups.

The claims specify the dyestuff obtainable from para-para^{1}-dichlorodiphenyl and two molecules of 1-aminoanthraquinone having probably the following formula:



which dyes cotton from a hydrosulphite vat fast violet shades.

VAT DYE OF THE ANTHRAQUINONE SERIES.

Wilhelm Herzberg and Walter Bruck, of Schöneberg, near Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 993,992, dated May 30, 1911.

According to the present invention new dyes of the anthra-

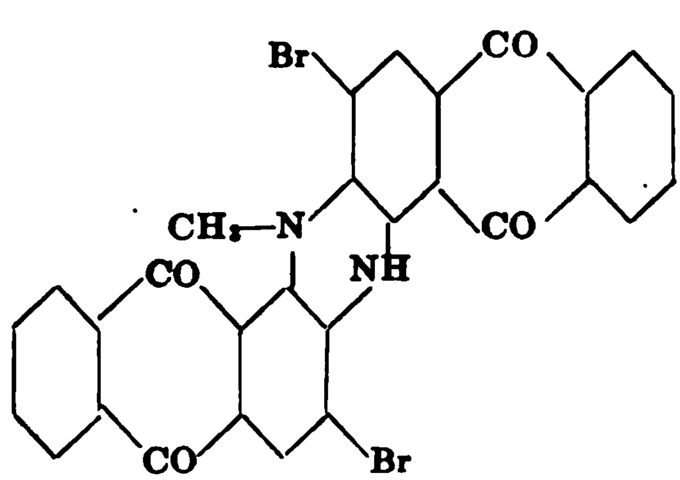
quinone series can be manufactured which contain sulphur and dye cotton without a mordant in a suitable vat; the invention is based on the observation that such dyestuffs may be obtained by acting with sulphur on a benzyl or benzylidene derivative of alpha-aminoanthraquinone or of a derivative thereof (except an amino derivative) or of a beta-aminoanthraquinone or of a derivative thereof, or on a derivative of such a benzyl or benzylidene compound. The reaction may be carried out in the presence or not of a suitable indifferent body.

The claims specify the product obtained by acting with sulphur in the presence of naphthalene upon dibenzylidene-2.6-diaminoanthraquinone, this new dye being 6-benzylidene-aminoanthraquinone-1.2-phenylthiazole, which new dye produces on cotton from a suitable vat a very clear and intense yellow shade of a very good fastness.

VAT DYE.

Max Kugel, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 994,-756, dated June 13, 1911.

This patent describes the manufacture and production of a new vat dyestuff which is obtained by condensing one molecule of 2-amino-1.3-dibromoanthraquinone with 2-methylamino-1.3-dibromoanthraquinone. A monomethylindanthrene is thus obtained of probably the following formula:



The new dye is after being dried and pulverized a blue crystalline powder soluble in boiling nitrobenzene with a blue color;

soluble in concentrated sulphuric acid with a brown color; being transformed into a hydro compound on suitable reduction with hydrosulphite and caustic soda lye, the alkaline solution thus obtained exhibiting the typical properties of a "vat," which dyes the fibre pure green-blue shades.

DYE.

Oskar Unger, of Leverkusen, near Cologne, and Paul Thomaschewski, of Vohwinkel, near Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 994,802, dated June 13, 1911.

The present invention relates to the manufacture and production of new red wool dyestuffs which are obtained by treating arylaminoanthronpyridones containing as arylamino radical with an unsubsituted para position with sulphonating agents in such a way that more than one sulphonic group is introduced into the molecule.

The new dyes are, in the shape of their alkaline salts, dark-red powders soluble in concentrated sulphuric acid generally with a reddish color which on addition of boric acid assumes an intense greenish-yellow to orange fluorescence, soluble in water and in alcohol generally with a red color; dyeing wool red shades.

The claims specifically cover 4-phenylamino-1-anthra-n-methylpyridone disulphonic acid.

YELLOW-COLORED DERIVATIVES OF INDIGO AND PROCESS OF MAKING SAME.

Gadient Engi and Jaroslav Fröhlich, of Basel, Switzerland, assignors to Society of Chemical Industry in Basel. Patent No. 994,988, dated June 13, 1911.

According to the statements in literature, when indigo is heated with excess of benzoyl-chloride it becomes dibenzoylindigo,

which is an amorphous brown powder, melting at 108° C. and can be reconverted into indigo by its treatment with a saponifying agent (compare *Beilstein*, Vol. 2, page 1621).

According to the present invention by the action of halides of acids of the aromatic series or analogously acting substances, such as benzoyl chloride or benzotrichloride, on an indigo substance, in the presence of a condensing agent, hitherto unknown condensation products are obtained, which by treatment with saponifying agents, are not capable of being reconverted into indigo.

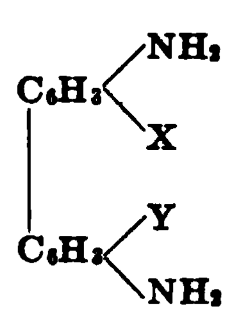
The new condensation products show an intense yellow coloration and yield by their treatment with fuming sulphuric acid sulpho-acids which dye wool in an acid bath beautiful yellow tints.

The claims specify the product from benzoyl chloride.

ORANGE COTTON DYES.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the Corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 995,160, dated June 13, 1911.

The inventor has discovered that valuable cotton dyestuffs are obtained by combining the tetrazo compounds of para-diamines of the general formula:



wherein X and Y, meaning H or SO_3H, are in ortho position to the amino group, with one molecular proportion of 1-sulphoaryl-3-methyl-5-pyrazolone and one molecular proportion of an aro-

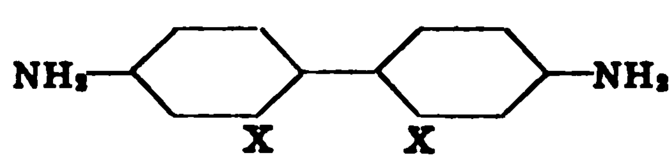
matic nitrometadiamine. The thus obtained dyestuffs dye cotton orange to orange-red shades, fast to copper and showing a remarkable fastness to light. Among paradiamines benzidine, its orthomono and ortho disulphonic acids may be used; among nitrometadiamines nitrometaphenylendiamine and nitrometa-toluylendiamine may be employed.

The claims specify the product obtained by combining the tetrazo compound of benzidine ortho-monosulphonic acid with one molecular proportion of 1-sulphophenyl-3-methyl-5-pyrazolone and one molecular proportion of nitro-meta-phenylen-diamine.

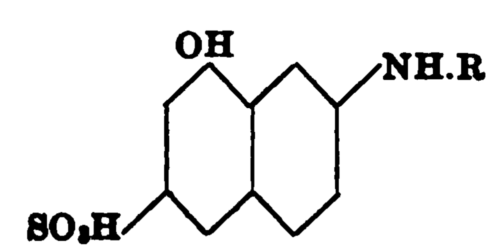
DISAZO DYES FOR WOOL.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the Corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 995,161, dated June 13, 1911.

This invention relates to the manufacture of disazo dyestuffs for wool and consists in combining tetrazotized diamino bases of the general formula:



wherein X means CH_3 or Cl with one molecular proportion of an ortho-oxy-carboxylic acid of the benzene series and in alkaline solution with one molecular proportion of a 2: amino-8-naphthol compound of the general formula:



wherein R means H or a substituent, for instance an alkyl—, an aralkl—, or an aryl group. The thus obtained dyestuffs dye

wool from acid bath from reddish to yellowish-brown shades, which in the milling process without after treatment with chromates do not stain interwoven white wool and cotton.

The claims specify the product from meta-meta'-dichlorobenzidine, salicylic acid and 2-phenyl-amino-8-naphthol-6-sulphonic acid.

BLUE TRIPHENYLMETHANE DYESTUFF.

August Stock and Friedrich Heim, of Höchst-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Brüning. Patent 995,494, dated June 20, 1911.

By condensing the p-chlorobenzaldehyde with ortho-oxylaryl-carboxylic acids and oxidizing the leuco derivatives thus obtained, there are produced dyestuffs capable of being subsequently chromed, which are, however, of little interest on account of the fact that they are not fast alkalis. The inventors have now found, that by heating these dyestuffs with aromatic bases, they are transformed into other coloring matters which are of great value owing to their pure tint and their great fastness to alkalis and milling. The reaction with the aromatic bases occurs already at the temperature of the water-bath; by adding a salt of the base it can be accelerated, but this is unnecessary. The reaction may also be effected in presence of a solvent, such as acetic acid of 90 per cent. strength.

The claims specify the dyestuff obtainable by heating with p-toluidine the coloring matter produced from p-chlorobenzaldehyde and ortho-cresotinic acid.

GREEN ANTHRACENE DYES AND PROCESS OF MAKING THE SAME.

Hugo Wolf, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 995,936, dated June 20, 1911.

The inventor claims that the benzanthronyl-1-amino-anthra-

quinone bodies which can be obtained by condensing 1-amino-anthraquinone compounds with halogenated benzanthrone compounds which contain the halogen in the benzanthrone ring, can be transformed, by treatment with condensing agents, into coloring matters which dye, from the vat, fast shades on vegetable fibre.

These new coloring matters possess the following generic properties. They are insoluble in water, but are soluble in nitrobenzene and in quinoline, yielding greenish solutions; they are also soluble in concentrated sulphuric acid yielding from green to red solutions. In the solid state they possess from green to greenish-black color. They are soluble in alkaline hydrosulphite yielding from blue to violet-blue vats, and these vats color cotton from blue to violet-blue shades, which shades on washing and drying become from green to bluish-green.

The coloring matter claimed specifically is that obtainable from benzanthronyl-1-amino-anthraquinone itself, and it yields a green solution in nitrobenzene, in quinoline, and in concentrated sulphuric acid. It can be obtained in the form of a green-black powder, and yields a blue-violet vat in alkaline hydrosulphite. This vat colors cotton blue-violet shades, which shades on washing and drying are converted into a very fast green.

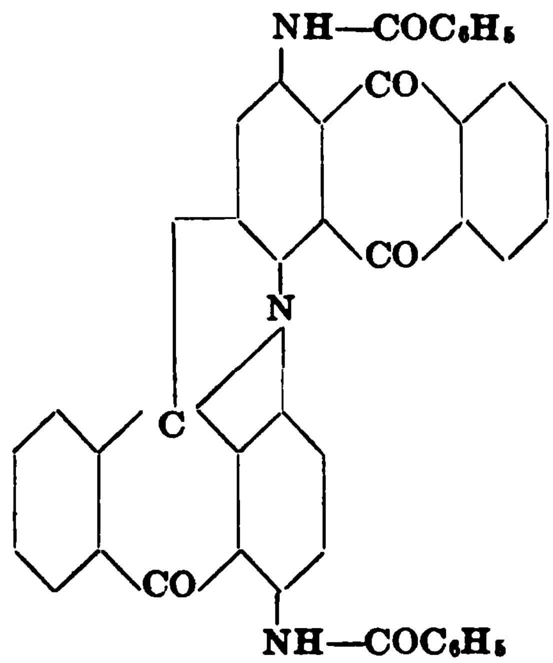
OLIVE-GRAY VAT DYE.

Walter Mieg, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 996,109, dated June 27, 1911.

The present invention relates to the manufacture and production of a new vat dye which dyes cotton from an alkaline hydrosulphite vat fast olive-gray shades.

The process for producing the new dye consists in treating dibenzoyl - para - para^1 - diamino - alpha - alpha$'$ - dianthrimide (produced by condensing 1-benzoylamino-4-chloroanthraquinone with monobenzoyl-1.4-diaminoanthraquinone, according to U. S. Letters Patent No. 971,224), with concentrated sulphuric acid.

This new dyestuff has probably the formula:

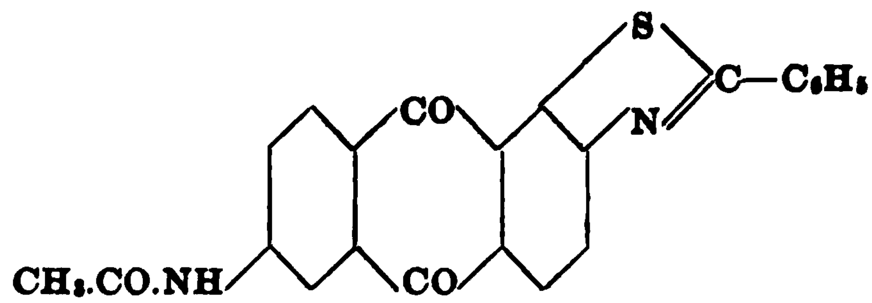


SULPHURIZED VAT DYE OF THE ANTHRAQUINONE SERIES.

Wilhelm Herzberg and Walter Bruck, of Schöneberg, near Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 996,485, dated June 27, 1911.

In a previous application these inventors describe and claim among others sulphurized vat dyes of the anthraquinone series deriving from a monobenzyl or monobenzylidene compound of 2.6- or 2.7-diamino-anthraquinone, which dyes possess most probably a so-called thiazole nucleus and on the other side a free amino group. Now, according to the present invention, these thiazole dyes are to be converted into new dyes by substituting in this amino group for a hydrogen atom an acidyl group that is to say the residue of an organic acid, such as for instance formyl, acetyl, benzoyl, phthalyl, malonyl, oxalyl, succinyl, etc. These new dyes are distinguished by a great intensity and good properties; they produce on cotton from a suitable vat, generally speaking, clear and intense yellow tints.

The claims specify 6-acetyl-amino-anthraquinonyl-1.2-phenyl-thiazole of the formula:



PROCESS OF MAKING ACID DYES OF THE ANTHRACENE SERIES.

Michael Iljinsky, of Uerdingen, Germany, assignor to the firm of R. Wedekind & Co. M. B. H. Patent No. 996,487, dated June 27, 1911.

Anthraflavic acid has hitherto not been employed for condensations with aromatic amines in the manufacture of dyestuffs.

The inventor claims that many derivatives of anthraflavic acid are extremely well adapted, under various conditions, to be combined with aromatic amines, and that the products of condensation obtained in the process yield exceedingly valuable brown, brown-red, violet-red, blue, and blue-green acid dyes. Suitable anthraflavin derivatives for this purpose are:

(A) Dinitrodisulphoanthraflavic acid, made by sulphonating anthraflavic acid without the addition of boric acid and thereafter nitrating the sulphonated product.

(B) The same sulphonated with the addition of boric acid and then nitrated. The structural formula of this compound is not yet known.

(C) The same sulphonated with the addition of mercury, in the presence or absence of boric acid, and then nitrated. The structural formula of this compound is not yet exactly known, the SO_3H groups are probably in the α position.

(D) Nitrated products of the dichloranthraflavinsulphonic acids made by chlorinating anthraflavic acid in the presence of an

alkali, by then sulphonating the product formed with or without the addition of boric acid, and by finally nitrating the chlorinated and sulphonated product. The structural formulæ of these products are still unknown. The condensation preferably takes place in the presence of the hydrochlorides of the corresponding aromatic amines. Very favorable results with the dichloranthraflavinsulphonic acids are effected by the simultaneous use of sulphur, sodium sulphide, and aromatic amines. The nitrated anthraflavinsulphonic acids give dark blue dyestuffs; the chlorated products are suited for the production of brown dyes.

BROWN VAT DYE.

Paul Thomaschewski and Heinrich Raeder, of Vohwinkel, and Walter Mieg and Paul Fischer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent reissue No. 13,257, dated June 13, 1911.

The present invention relates to the manufacture and production of a new vat dye of the anthracene series. The new process for its preparation consists in condensing 1-amino-4-benzoylaminoanthraquinone with 1-benzoylamino-5-chloroanthraquinone and treating the resulting compound with concentrated sulphuric acid.

The new product is after being dried and pulverized a brown-black powder soluble in cold concentrated sulphuric acid with a brown color. It yields on treatment with hydrosulphite and cautsic soda lye a vat suitable for dyeing cotton fast brown shades.

TETRAKISAZO DYE.

Wilhelm Herzberg, of Schöneberg, near Berlin, and Werner Lange, of Treptow, near Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 997,061, dated July 4, 1911.

This invention relates to the manufacture of valuable dyes for cotton, which may be obtained by combining with two molec-

ular proportions of a meta-diamine of the benzene series one molecular proportion of a tetrazotized dye made from two molecular proportions of a diazotized amino-acid and one molecular proportion of a symmetrical 3.3'-diaminodiaryl-urea of the benzene series. The tetrakisazo dyes thus manufactured produce on cotton directly red-brown tints, which by subsequent treatment with 4-nitrodiazobenzene become deep red-brown of excellent fastness to washing and to light.

The claims specify the dyestuff from metanilic acid symmetrical 3.3'-diamino-diphenyl-urea and meta-phenylenediamine.

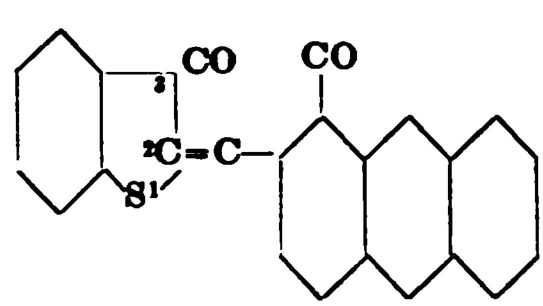
VAT DYE.

Wilhelm Bauer, of Vohwinkel, near Elberfeld, and Alfred Herre, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 997,260, dated July 11, 1911.

The present invention relates to the manufacture and production of new vat dyestuffs, which are obtained by condensing 1 molecule of a 2-arylido-3-keto-dihydro-1-thionaphthene compound, especially 2-para-dimethylaminoanilido-3-keto-dihydro-1-thionaphthene, 2-para-dimethylamino-anilido-3-keto-dihydro-5-chloro-1-thionapthene with 1 molecule of 1-anthrol.

The new dyes yield with hydrosulphite and NaOH vats dyeing cotton fast violet shades.

The claim specifically covers the new vat dyestuff having probably the formula:



which yields upon treatment with hydrosulphite and NaOH a brownish-yellow vat from which cotton is dyed in pure fast violet shades.

Patents for the Year 1911

HALOGENIZED VAT DYESTUFFS AND PROCESS OF MAKING SAME.

Gadient Engi and Jaroslav Fröhlich, of Basel, Switzerland, assignors to Society of Chemical Industry in Basel. Patent No. 997,766, dated July 11, 1911.

In the specification of a former application for Letters Patent, filed December 28, 1910, is described the manufacture of new colored condensation products by treating an indigo substance with a halide of an acid of the aromatic series, in the presence of a condensing agent, the said condensing products possessing the valuable property of yielding on treatment with reducing agents, leuco compounds soluble in alkalis and dyeing vegetable and animal fibres in an alkaline vat beautiful yellow tints of excellent fastness. According to the present invention these condensation products can be transformed by treatment with halogens or substances yielding halogens, into new halogenized derivatives, also constituting valuable dyestuffs dyeing in a vat but distinguished from the parent products of condensation in that they furnish, generally speaking, purer and in part much redder tints, and possess a greater affinity, particularly for vegetable fibres.

GREENISH-BLUE TRIPHENYLMETHANE DYE.

Max Weiler, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 998,139, dated July 18, 1911.

The inventor has found that the pentachlorobenzaldehyde can be advantageously used to produce a new valuable mordant dyestuff of the triaryl-methane series. The process for its manufacture consists in condensing the pentachlorobenzaldehyde with ortho-cresotinic acid to a leuco compound which is converted by oxidation into a dyestuff capable of being chromed after dyeing, furnishing greenish-blue shades fast to alkali, milling, and potting.

BLUE VAT DYE.

Max Buff, of Vohwinkel, near Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 998,156, dated July 18, 1911.

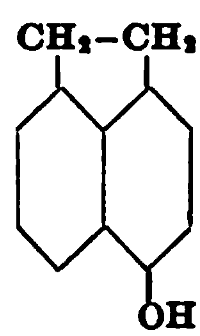
The inventor has found that new vat dyes can be obtained by condensing 1-amino-4-bromo-anthraquinone substituted in the amino group with isatine. The dyes thus obtained are after being dried and pulverized dark powders yielding with caustic soda lye and hydrosulphite vats dyeing cotton fast blue.

The claims specify the dyestuff from 1-methyl-amino-4-bromo-anthraquinone.

VAT DYE.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 998,596, dated July 25, 1911.

This invention relates to the manufacture and production of new and valuable vat dyestuffs. They are obtained by condensing isatine compounds in which the oxygen of the alpha-keto group is replaced by easily movable or replaceable substituents—*e.g.*, halogen, sulphur, the amino group, the alkoxy group with 4-oxy-acenaphthene of the formula:



These new dyestuffs yield with hydrosulphite and caustic soda lye vats dyeing cotton after exposure to air grayish-blue to blue to green shades remarkable for their fastness to chlorine.

The claims specifically cover the product from dibromo-isatine-alpha-chloride.

Patents for the Year 1911

BLUE DYESTUFF AND PROCESS OF MAKING SAME.

Max Hessenland, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 998,-772, dated July 25, 1911.

The inventor has found that by causing dehydrating agents to act upon 1.4-aminoanthraquinonylanthranilic acid, a greenish-blue dyestuff is obtained, which is remarkable for its properties and which can be used both as a pigment dye and as a vat dye.

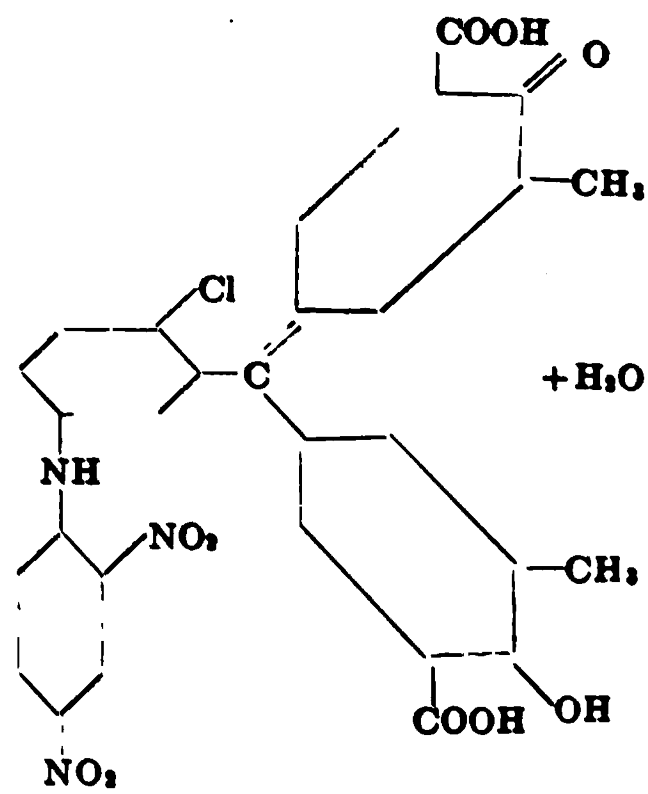
The new product is the 4-amino-anthraquinone-*a*-acridone. When treated with alkaline hydrosulphite it yields a violet vat which dyes cotton, on oxidation in the air, beautiful greenish-blue tints.

TRIPHENYLMETHANE DYE.

Arthur Hausdörfer, of Elberfeld, and Carl Heidenreich, of Leverkusen, near Cologne, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 999,028, dated July 25, 1911.

It has been found that new and valuable triphenylmethane dyestuffs capable of being chromed after dyeing are obtained by treating the leuco compounds of the triphenylmethane series (obtained by condensing aminobenzaldehydes which may contain substituents in the benzene nucleus with 2 molecules of an aromatic oxycarboxylic acid) with chlorodinitrobenzene compounds, especially 1.3-dichloro-4.6-dinitrobenzene, 1-chloro-2.4-dinitrobenzene, 1-chloro-2.6-dinitrobenzene-4-sulphonic acid, 1-chloro-4.6-dinitrobenzene-2-sulphonic acid and by converting the resulting leuco compounds into the dyestuffs by oxidation.

The claims specify the product of the formula:



MANUFACTURE OF BROWN SULPHURIZED VAT DYESTUFFS.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the Corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 999,045, dated July 25, 1911.

In the specification of U. S. Patent No. 597,983 black sulphurized dyestuffs have been described, obtained by heating with alkali polysulphides 1.5-dinitroanthraquinone or raw dinitroanthraquinone, obtained by nitrifying anthraquinone, or products of reduction thereof. It is now found that quite different dyestuffs are obtained by heating the aforesaid anthraquinone derivatives with alkalipolysulphides (preferably under pressure), until a test portion of the products of reaction no longer dissolves in aqueous solutions of alkali sulphides. The thus obtained dyestuffs are insoluble in water, alkali-lyes, and solutions of alkali-sulphides. They bear the properties of vat-dyestuffs and dye from the hydrosulphite-vat cotton very fast olive-brown shades.

Patents for the Year 1911

AZO DYE.

Georg Kalischer, of Frankfort-on-the-Main, Germany, assignor to Cassella Color Company. Patent No. 999,230, dated August 1, 1911.

This invention relates to the manufacture of new azo dyestuffs by means of the m-aminophenylnaphtimidazole.3.oxy.6.sulphonic acid of the formula

$$C_{10}H_4\begin{cases} \begin{array}{ll} N \searrow & \\ \quad \rangle C.C_6H_4NH_2 & (1.2) \\ NH \nearrow & \\ OH & (3) \\ SO_3H & (6) \end{array} \end{cases}$$

This hitherto unknown compound may be obtained by condensing with aminobenzaldehydebisulphite 1.2-diamino.3.naphthol,-6.sulphonic acid. The new acid is difficultly soluble in water, and its sodium salt crystallizes well and is somewhat difficultly soluble in cold water.

The dyestuffs prepared by combining one molecule of the new acid with one molecule of an aromatic diazo compound have a remarkable affinity for vegetable fibre, and dye cotton directly yellow to red shades. The dyeings thus obtained may by diazotizing and developing with beta naphthol be transformed into orange to red shades of very good fastness to washing.

The claims specifically cover the compound obtained by combining in alkaline solution the diazo compound of aniline with one molecular proportion of the m-aminophenyl.1.2.naphtimideazole.3.oxy.6.sulphonic acid.

VAT-DYEING COLORING MATTER.

Karl Elbel and Edward Wray, of Biebrich, Germany, assignors to the firm of Kalle & Company. Patent No. 999,439, dated August 1, 1911.

The claims cover:

1. The production of fast vat coloring matters consisting in treating with bromine the products obtainable by condensation of reactive alpha-isatine derivatives with oxy derivatives of cyclic hydrocarbons.

2. The herein described process of producing a fast vat coloring matter consisting in treating with bromine the product obtained by condensing dibromo-alpha-isatine-chloride with alpha-naphthol.

3. As a new product the vat coloring matter consisting of the brominated indol-alpha-naphtholindigo being blue powder soluble in sulphuric acid with greenish-blue color, in hot nitrobenzene and in hot aniline with pure blue color, soluble in water and alcohol, yielding on alkaline reduction a yellow vat in which the textile fibres are dyed in bright blue shades.

POLYAZO DYE AND PROCESS OF MAKING SAME.

Rudolf Haugwitz, of Friedrichshagen, near Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 999,558, dated August 1, 1911.

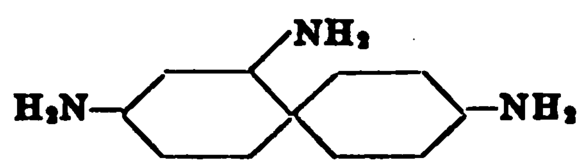
This invention relates to the manufacture of new polyazo dyes which may be obtained by combining one molecular proportion of a tetrazotized para-diamino compound with one molecular proportion of 1-amino-8-naphthol-2.4-disulphonic acid and one molecular proportion of a meta-diamine of the benzene series. The dyes thus manufactured produce on cotton directly blue tints, by subsequent treatment with 4-nitrodiazobenzene passing to full bluish-black tints, which can be discharged to a pure white.

The claims specify the product from combining one molecular proportion of the tetrazotized 4-aminobenzene-azo-3-amino-4-cresolmethylether with one molecular proportion of 1-amino-8-naphthol-2.4-disulphonic acid and one molecular proportion of a meta-diamine of the benzene series.

BROWN BASIC AZO DYE.

Herbert Gorke, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 999,713, dated August 1, 1911.

Basic azo dyestuffs prepared from triaminodiphenyl, *e.g.*



have not yet been described and used.

The inventor has discovered that a new class of basic azo dyestuffs can be obtained from triamino-diphenyl which dyestuffs contain this compound as middle component. These new dyestuffs are distinguished by the valuable property of being capable of dyeing artificial silk (Chardonnet-silk, Glanzstoff), etc., directly in shades fast to water.

The new process for the manufacture of these dyestuffs consists in combining diazotized amines or acyldiamines with triaminodiphenyl, tetrazotizing the monoazo dyestuffs thus obtained or hexazotizing the products obtained from acidyldiamines after elimination of the acidyl group and finally combining the tetrazo- or hexazo- compounds thus produced either with the same or with mixtures of suitable amines, diamines, naphthylenediamines, aminonaphthols, or alkyl derivatives of these compounds.

REDDISH-BLUE TRISAZO DYE.

Heinrich Jordan, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 999,797, dated August 8, 1911.

The inventor discovered that valuable trisazo dyestuffs, which can be diazotized and developed on the fibre can be obtained by first combining the diazo compounds of acidyl-para-phenylenediamines with a middle component capable of being after com-

bination further diazotized, rediazotizing the products thus obtained, combining them with a second molecule of such middle component, rediazotizing the aminodisazo compounds and combining the diazo bodies thus obtained with pyrazolones, such as methyl-phenyl-pyrazolone, methyl-aryl-pyrazolone sulphonic acids, methyl-aryl-pyrazolones, naphthylpyrazolones or their sulphonic acids, methyl-pyrazolones, pyrazolone carboxylic acids, sulpho-aryl-pyrazolone-carboxylic acids and finally removing the acidyl group from the dyestuffs. The coloring matters thus produced are after being dried and pulverized in the shape of their alkaline salts dark powders soluble in water; yielding upon treatment with hydrosulphite and alkali para-phenylenediamine, one or two diamines and an aminopyrazolone. They dye cotton in from violet to blue shades which can be diazotized and developed on the fibre. On developing them for instance with beta-naphthol pure violet to blue shades are obtained of very good fastness to washing and to light and distinguished by the ease with which they can be discharged with hydrosulphites to a pure white.

The claims specifically cover the product from paraphenylenediamine two molecules of 1-naphthylamine-6-sulphonic acid and 1-phenyl-3-methyl-5-pyrazolone.

VAT DYE AND PROCESS OF MAKING SAME.

Georg Kalischer, of Frankfort-on-the-Main, Germany, assignor to Cassella Color Company. Patent No. 999,798, dated August 8, 1911.

Whereas the α-β anthrimides which may be obtained by condensation of β-chloranthraquinone derivatives with α-anthraquinone derivatives are useful vat colors, as may be seen from the description of Patent No. 863,397, the α-α-anthrimides resulting from the condensation of α-chloranthraquinone derivatives with α-amidoanthraquinone derivatives could not in practice be used as vat colors because their leuco products possess no affinity for cotton. The inventor has now discovered that these α-α-anth-

rimides when heated with anhydrous aluminum chloride, alone or in the presence of a diluting agent, are transformed into new compounds which are chemically absolutely different from the starting materials, and which possess the valuable property to dye cotton full brownish-orange to brown shades from easily soluble vats.

The claims specify the product from α-α-dianthraquinonyl.1.5.-diamidoanthraquinone (obtained by condensing one molecular proportion of 1.5 diamidoanthraquinone with two molecular proportions of α-chloranthraquinone).

VAT DYESTUFF OF THE ANTHRACENE SERIES.

Friedrich Singer, of Offenbach-on-the-Main, Germany, assignor to Corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 999,680, dated August 1, 1911.

The inventor has discovered that new valuable vat dyestuffs can be obtained by heating the products of reduction of anthraquinone, which result by condensation of two anthraquinone molecules on the meso-carbon-atom, as for instance dianthrone, dianthranole, bianthrone with condensing agents in presence of or without a diluent. As condensing agents may be used aluminium chloride, ferric chloride, antimony pentachloride, chromic chloride, sulphuric acid, chloride of zinc, mercuric chloride, stannic chloride, and analogous acting substances.

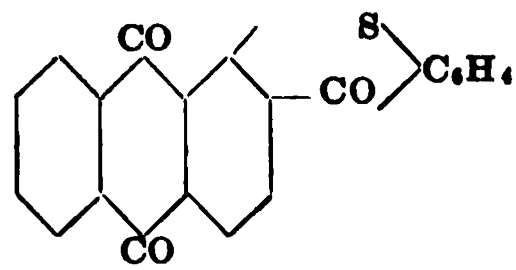
The claims specify the product obtained by heating dianthrone with aluminium chloride in the presence of nitrobenzene. It dyes cotton chocolate-brown shades from a hydrosulphite vat.

VAT DYESTUFF.

Max Hessenland, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 999,785, dated August 8, 1911.

The inventor claims that dianthraquinonylamines which contain the thioxanthone group are vat dyestuffs of great value.

They are derived from the anthraquinonethioxanthone of the constitution:



and can be obtained by treating the amino- or the halogen-anthraquinone-thioxanthones with halogen-, respectively amino-, derivatives of the anthraquinone.

The claims cover specifically the product, the 1-anthraquinonylamine-5.6-anthraquinone-thioxanthone, obtainable by combining 1-amino-5.6-thioxanthone with α-chloranthraquinone.

This gives a brownish-violet hydrosulphite vat which dyes cotton claret-red shades.

YELLOW DISAZO DYE.

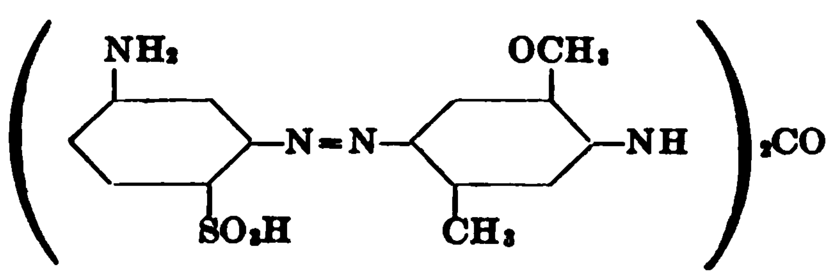
Arthur Zart, of Vohwinkel, near Elberfeld, and Hugo Schweitzer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 999,944, dated August 8, 1911.

The present invention relates to the manufacture and production of new azo dyestuffs capable of dyeing unmordanted cotton in from yellow to orange shades which on being developed on the fibre become fast to washing.

The process for their production consists in converting into urea compounds sulphonic acids of nitroaminoazo compounds in which the nitro and amino groups are contained in different nuclei or of the corresponding diaminoazo compounds in which one hydrogen of one amino group is replaced by an acid radical and in subsequently reducing the products obtained from the nitroaminoazo compounds or in saponifying the products ob-

tained from diaminoazo compounds containing an acid radical. The urea compounds are produced in the usual way by treatment with phosgene.

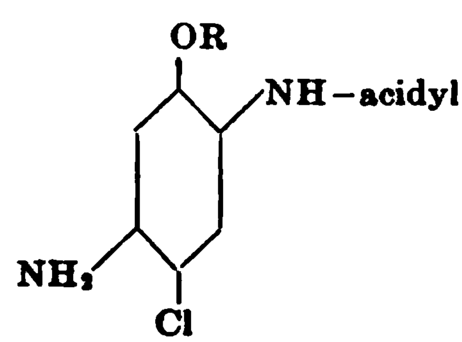
The claims specify the new dyestuff being the urea of the azo compound from meta-phenylenediamine sulphonic acid and cresidine of the formula:



BLUE DISAZO DYE.

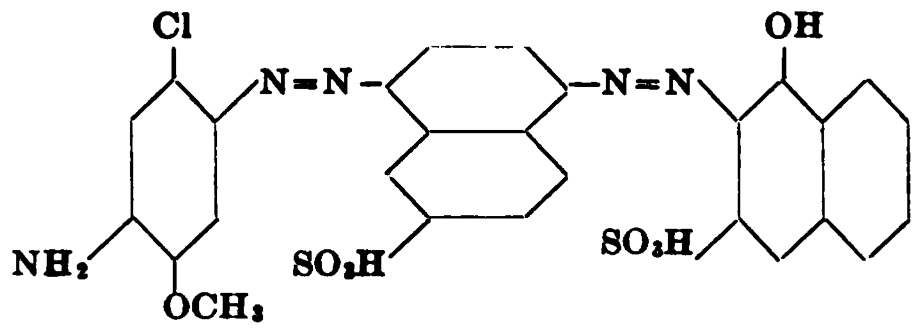
Heinrich Jordan and Wilhelm Neelmeier, of Leverkusen, near Cologne, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,000,269, dated August 8, 1911.

It has been found that valuable disazo dyestuffs which can be diazotized and developed on the fibre are obtained by combining the diazo compounds of 5-amino-4-chloro-2-acidylamino-1-phenol ethers of the formula:



(R means alkyl) with 1-naphthylamine-6- or 7-sulphonic acid or with a mixture of both acids, rediazotizing the compounds thus obtained, combining them with 1.3-naphthol sulphonic acid and splitting off the acidyl radical. Blue cotton dyestuffs are thus obtained.

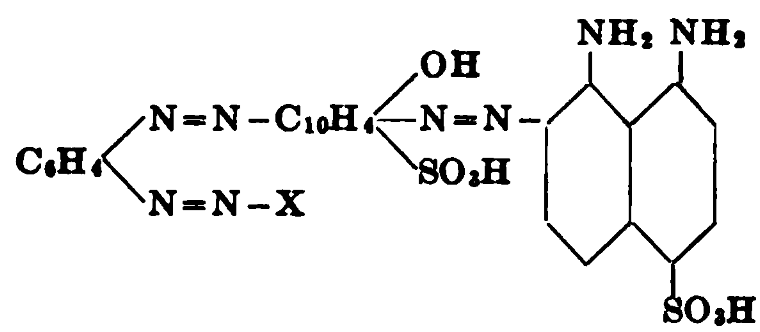
The claims specify the dyestuff of the formula:



BLACK TRISAZO DYE.

Myrtil Kahn and Anton Ossenbeck, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,000,606, dated August 15, 1911.

This invention relates to the manufacture and production of new trisazo dyestuffs having most probably the formula:



(X meaning a benzene derivative).

The process for their production consists in combining the tetrazo compound obtained from para-amino-benzene-azo-2-amino-8-naphthol-6-sulphonic acid or from para-amino-benzene-azo-2-amino-5-naphthol-7-sulphonic acid with one molecule of 1.8-naphthylene-diamine-4-sulphonic acid and with one molecule of an amine or a phenol, such as meta-diamine, phenol, or aminophenol, or derivatives thereof. They are suitable for dyeing cotton. The shades thus obtained can be developed with diazotized para-nitraniline deep blue-black to black shades of good fastness being obtained.

The claims specify the dyestuff from 2-amino-8-naphthol-6-sulphonic acid and toluylene-diamine.

Patents for the Year 1911

LEUCO DYESTUFFS OF THE GALLOCYANINE SERIES AND PROCESS OF MAKING SAME.

Charles De la Harpe and Rudolf Burckhardt, of Basel, Switzerland, assignors to the firm of Dyeworks formerly L. Durand, Huguenin & Co. Patent No. 1,000,899, dated August 15, 1911.

According to the present invention new leuco dyestuffs of the gallocyanine series are made by reaction between gallocyanines and aralkylamines and reduction of the resulting condensation products. The reaction between gallocyanines and aralkylamines is of a different nature from that between gallocyanines and alkylamines and yields products which dissolve in concentrated sulphuric acid to a red solution instead of to a blue solution. These products, therefore, probably have the same constitution as the condensation products from arylamines and gallocyanines, as further evidence of which may be cited the fact that when warmed with dilute sulphuric acid they yield oxygallocyanines, the aralkylamino group being exchanged for the hydroxyl group. These condensation products, when they contain no free acid residues such as sulphonic or carboxylic groups are difficultly soluble in alkalis; the products from gallic acid gallocyanines, on the other hand, are soluble in alkalis to reddish-violet solutions. When these solutions are boiled the corresponding pyrogallol derivatives are obtained, which are insoluble in sodium carbonate solution. These new aralkylamino-gallocyanines are also little soluble in very dilute acids, but can be converted into easily soluble leuco derivatives by reduction with the usual reducing agents. These soluble derivatives yield beautiful greenish-blue tints on chrome mordants.

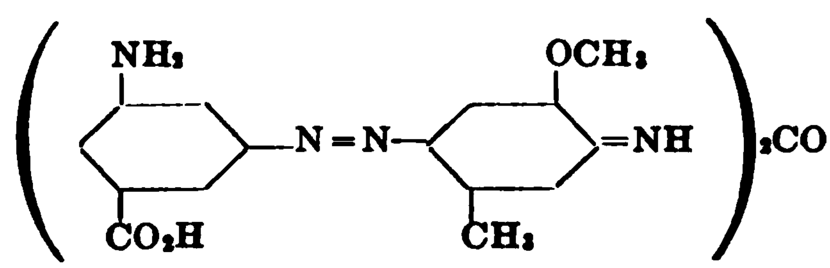
YELLOW DISAZO DYE.

Arthur Zart, of Vohwinkel, and Hugo Schweitzer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,001,183, dated August 22, 1911.

The present invention relates to the manufacture and production of new azo dyestuffs capable of dyeing unmordanted cotton in from yellow to orange shades which on being developed on the fibre becomes fast to washing.

The process for their production consists in converting into urea compounds carboxylic acids of nitroaminoazo compounds in which the nitro and amino groups are contained in different nuclei or of the corresponding diaminoazo compounds in which one hydrogen of one amino group is replaced by an acid radical and in subsequently reducing the products obtained from the nitroaminoazo compounds or in saponifying the products obtained from diaminoazo compounds containing an acid radical. The urea compounds are produced in the usual way by treatment with phosgene.

The claims specify the dyestuff being the urea of the azo compound from 3.5-diaminobenzoic acid and cresidine of the formula:



which dyes cotton yellow shades fast to washing after combination with diazotized para-nitraniline.

ANTHRACENE COMPOUNDS AND MAKING SAME.

Max Henry Isler, of Mannheim, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 1,001,408, dated August 22, 1911.

The inventor has found that benzoyl-amino-ortho-halogen-anthraquinone and derivatives thereof can be caused to undergo condensation, whereby a new ring is formed, and compounds are produced which can apparently be regarded as phenanthridones of the anthraquinone series. The condensation is preferably car-

ried out by means of a condensation agent, and the products can be employed as coloring matters or in the production of coloring matters.

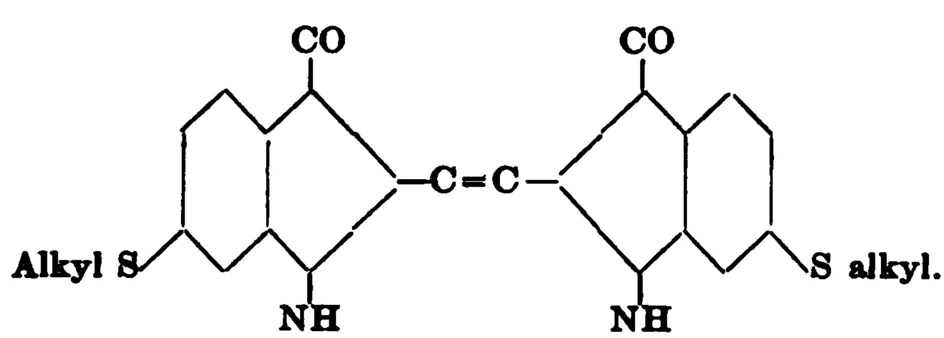
The claims specify the compound obtainable by treating 1.5-dichlor-2.6-dibenzoyl-diamino-anthraquinone with a condensing agent. This dyes cotton from a hydrosulphite vat yellow shades.

GREEN TO BLACK VAT DYESTUFF.

Karl Schirmacher, of Höchst-on-the-Main, and Richard Leopold, of Hochheim-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,001,457, dated August 22, 1911.

Whereas, by introducing substituents into the thioindigo molecule, it is possible to vary the tints of the dyestuffs of the thioindigo series from orange to black, this quality has not been observed in the dyestuffs of the indigo series, the color of all the indigo derivatives hitherto known being blue or purple. Now it is found that dyestuffs of other tints are obtained by introducing alkylthio groups into the indigo molecule in the "meta" position to the nitrogen. Such indigo derivatives are obtained by subjecting to oxidation those indoxyl derivatives which can be produced from 5-alkylthio-phenyl-1-glycine-2-carboxylic acid, and they are dark-green to black vat dyestuffs which can be easily reduced to vats and dye in the vat cotton and wool fast tints.

The formula of the new dyestuffs is as follows:



The claims specify the diethyl compound.

BLUISH-RED AZO DYESTUFF.

Karl Schirmacher, of Höchst-on-the-Main, and Richard Leopold, of Hochheim-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,001,458, dated August 22, 1911.

The inventors have found that by combining the diazo compound of 5-nitro-2-amino-1-benzyl-sulphonic acid $C_6H_3(NO_2)(NH_2)CH_2SO_3H$ with 2:3-oxynaphthoic acid, a bluish-red azo dyestuff is obtained, which is very valuable for the preparation of color lakes. This dyestuff surpasses the analogous dyestuff, obtained from the corresponding nitraniline sulphonic acid, by its fastness to light.

The formula of the new dyestuff is as follows:

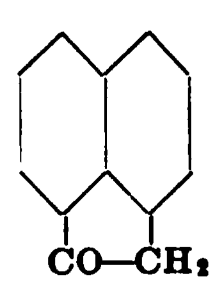
$$C_6H_3\left\langle\begin{matrix}NO_2 \\ \\ CH_2SO_3H\end{matrix}\right. \!\!-\!\!-\!\!-\!\! N=N-C_{10}H_5\left\langle\begin{matrix}OH \\ \\ COOH.\end{matrix}\right.$$

Its barium and calcium salts are insoluble in water.

VAT DYE.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,001,919, dated August 29, 1911.

This invention relates to the manufacture and production of new and valuable vat dyestuffs. They are obtained by condensing isatine compounds in which the oxygen of the alpha-keto group is replaced by easily movable or replaceable substituents—*e.g.*, halogen, sulphur, the amino group, the alkoxy group, with the acenaphthenone of the formula:



The new dyes are in a dry state dark reddish-brown crystalline powders with a metallic lustre which are soluble in hot benzene generally with a bluish-red coloration, and which yield with hydrosulphite and caustic soda lye vats dyeing cotton after exposure to air red to violet shades.

The claims specifically cover the dyestuff being a condensation product of dibromo-isatine-alpha-chloride and acenapththenone, which dyes bluish-red shades.

VAT DYE.

Arthur Lüttringhaus, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 1,002,066, dated August 29, 1911.

The inventor has discovered a new vat coloring matter of the anthracene series which can be obtained by condensing 1-halogen-anthraquinone-2-carboxylic acid with para-chlor-aniline and then subjecting the product so obtained to a further condensing action, so that the elements of water are removed and ring formation takes place. The condensation can be effected, for instance, by means of concentrated sulphuric acid, or thionyl chloride, or phosphorus pentachloride.

It dyes cotton in the hydrosulphite vat bluish-red shades.

VAT DYESTUFF OF THE ANTHRAQUINONE SERIES AND PROCESS OF MAKING SAME.

Max Hessenland, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,002,270, dated September 5, 1911.

The inventor has found that valuable vat dyestuffs can be obtained by introducing into the amino group of the 4-amino-anthraquinone-α-acridones, radicals, such as an alkyl-, aryl- or acidyl group, or an anthraquinone residue.

The process consists in causing halogen compounds of these radicals to react with 4-amino-anthraquinone-α-acridones.

The claims specify the dyestuff, namely, the 4-amino-anthra-

quinone-α-acridone which contains the radical-α-anthraquinonyl linked in the amino group.

It dyes cotton gray to black shades from the hydrosulphite vat.

RED MORDANT DYESTUFFS AND PROCESS OF MAKING SAME.

Charles De la Harpe and Ernst Bodmer, of Basel, Switzerland, assignors to the firm of Dyeworks formerly L. Durand, Huguenin & Co. Patent No. 1,002,825, dated September 12, 1911.

The inventors have found that new red mordant dyestuffs are obtained by condensing an amino-meta-oxybenzoylbenzoic acid substituted in the amino group with a resorcine sulphonic acid. This process is applicable to all known mono- and di-alkylated, benzylated, ethylbenzylated or phenylated amino-meta-oxy-benzoylbenzoic acids. The same dyestuffs are obtained whether resorcinemonosulphonic acid or resorcinedisulphonic acid are employed. The new dyestuffs thus obtained are sulphorhodols and dye chrome-mordanted fibres clear bluish-red to yellowish-red tints.

VIOLET MORDANT DYESTUFF AND PROCESS OF MAKING SAME.

Charles De la Harpe and Ernst Bodmer, of Basel, Switzerland, assignors to the firm of Dyeworks, formerly L. Durand, Huguenin & Co. Patent No. 1,003,257, dated September 12, 1911.

The inventors have found that new violet mordant dyestuffs are obtained by condensing an amino-meta-oxybenzoylbenzoic acid substituted in the amino group with a pyrogallol sulphonic acid. The condensation is obtained by warming the compounds together in a suitable medium, such as sulphuric acid or bisulphate.

This process is applicable to all known mono- and di-alkylated,

benzylated, ethylbenzylated or phenylated amino-meta-oxy-benzoyl-benzoic acids.

The same dyestuffs are obtained whether pyrogallol-monosulphonic acid or pyrogallol-disulphonic acid are employed. The new dyestuffs thus obtained dye chrome-mordanted fibres violet to brown-violet tints. They are strongly marked mordant dyestuffs. These new dyestuffs are further characterized by the excellent solubility of their alkali salts in water.

MONOAZO DYE.

Hugo Jaesschin, of Berlin, and Oskar Kaltwasser, of Dessau, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 1,003,266, dated September 12, 1911.

This invention relates to the manufacture of a new monoazodye which produces on wool from an acid bath after chroming on the fibre violet shades of very good fastness and which also may serve for production of violet lakes of a remarkable resistance to the action of light. This new dye is a combination product of diazotized 4-chloro-2-aminophenol-6-sulphonic acid with 2-naphthol-3-carboxylic acid.

ANTHRACENE DYE AND PROCESS OF MAKING SAME.

Richard Just and Hugo Wolff, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin & Soda Fabrik. Patent No. 1,003,268, dated September 12, 1911.

The specification of U. S. Patent No. 837,775 describes the production of coloring matters containing halogen by treating with halogen, or with other halogenizing agent, the coloring matters of the anthracene series which can be obtained by heating a compound containing a benzanthrone group with alkali. The specification of U. S. Patent No. 906,367 describes the production of coloring matter of the anthracene series by treating,

with caustic alkali, a halogenated benzanthrone compound, such for instance, as halogen benzanthrone and halogen benzanthrone-quinoline. The coloring matters produced according to the said specification of Patent No. 906,367 are structurally different from those employed according to the process of the said specification of Patent No. 837,775.

The inventors claim that the coloring matters which are obtainable by treating a halogenated benzanthrone compound with caustic alkali and which have the isoviolanthrene structure, on being treated with halogen, or with a compound which evolves halogen, can be converted into new halogen derivatives and that these halogen derivatives constitute very valuable coloring matters which dye cotton from the vat brilliant shades.

The coloring matter claimed specifically is dichlor-isoviolanthrene, which produces on cotton reddish-violet shades of excellent fastness.

MONOAZO DYE FOR WOOL.

Heinrich Polikier, of Leipzig, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 1,003,293, dated September 12, 1911.

This invention relates to the manufacture of new yellow monoazo dyes for wool fast to washing, which may be obtained by combining diazo compounds of the benzene series, substituted by chlorine in the ortho position to the nitrogen with alkyl-aralkylaniline-monosulphonic acids.

The claims specifically cover the monoazo dye derived from diazotized 2.5-dichloroaniline and ethylbenzylaniline sulphonic acid, which dyes wool from an acid bath yellow shades.

VIOLET WOOL DYE.

Paul Thomaschewski, of Vohwinkel, near Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,004,107, dated September 26, 1911.

This invention relates to new violet wool dyes which can be obtained by heating 1-alkylamino-4-arylamino-anthraquinones with urea and a condensing agent. By treatment with sulphonating agents they are converted into the soluble sulphonic acids which are soluble in water with a violet color and dyeing wool from acid baths fast violet shades.

The claim specifies the product from 1-methylamino-4-paratoluylamino anthraquinone.

TRIPHENYLMETHANE DYE.

Max Weiler, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,004,609, dated October 3, 1911.

The present invention relates to the manufacture and production of a new triphenylmethane dye, which is distinguished by a high fastness to alkali and to milling.

The process for its production consists in condensing dibromo-meta-oxy-benzaldehyde with ortho-cresotinic acid and oxidizing the leuco compound. This product yields greenish-blue shades either by dyeing on chromed wool, after chroming, or by the monochrome process.

BLUE TRIPHENYLMETHANE DYESTUFF.

Max Weiler, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,004,610, dated October 3, 1911.

The present invention relates to the manufacture and production of a new triphenylmethane dye, which is distinguished by a high fastness to alkali and to milling.

The process for its production consists in condensing dichloro-meta-oxy-benzaldehyde with ortho-cresotinic acid and oxidizing the leuco compound. This product can be dyed on chrome-mordanted wool, after chromed or by the monochrome process. It yields pure blue shades.

VAT DYE.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,005,140, dated October 10, 1911.

This invention relates to the manufacture and production of new vat dyestuffs. They are obtained by condensing beta-naphthisatine derivatives in which the oxygen of the alpha-keto group is replaced by easily movable or replaceable substituents, *e.g.*, halogen, sulphur, the amino group, the alkoxy group with a para-substituted 1-naphthol, especially 4-ethoxy-1-naphthol, 4-bromo-1-naphthol, 4-chloro-1-naphthol.

The claims specify the product from 4-bromo-1-naphthol, which dyes cotton gray to black shades.

VAT DYE.

Wilhelm Bauer, of Vohwinkel, and Alfred Herre and Rudolf Mayer, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,005,141, dated October 10, 1911.

This invention relates to the manufacture and production of new vat dyestuffs. They are obtained by condensing beta-naphthisatine derivatives in which the oxygen of the alpha-keto group is replaced by easily movable or replaceable substituents, *e.g.*, halogen, sulphur, the amino group, the alkoxy group with an alpha-oxyanthracene, especially 1-anthrol, 1.5-dioxyanthracene, 1.8-dioxyanthracene and their derivatives having a free ortho position to the hydroxy group.

The claims specify the product from 1-anthrol which dyes cotton violet-gray to reddish-black shades.

ORANGE WOOL DYE.

Richard Kothe, of Vohwinkel, Oscar Dressel, of Elberfeld, and Heinrich Hoerlein, of Vohwinkel, Germany, assignors to

Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,005,233, dated October 10, 1911.

This invention relates to the manufacture and production of new azo dyestuffs suitable for dyeing wool which are obtained by combining the diazo compounds of aminoarylsulphonamides with acidylized aminonaphthol sulphonic acids. The new dyestuffs have most probably the general formula:

$$\begin{matrix} A_1 \\ A_2 \end{matrix} \Big\rangle N-SO_2A-N=N-C_{10}H_2 \Big\langle \begin{matrix} NH-\text{acidyl} \\ OH \\ SO_3H \\ X \end{matrix}$$

($A =$ aryl, A_1 and $A_2 =$ hydrogen or a substituent, $X =$ hydrogen or a sulphonic group). They dye wool from orange to blue-red shades which are remarkable for their excellent fastness to milling, washing, and light.

The claims specify the dyestuff from 2-toluidine-4-sulphon-ortho-aniside and 2-acetylamino-5-naphthol-7-sulphonic acid.

PREPARATION SUITABLE FOR THE INDIGO-VAT.

Albrecht Schmidt, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,005,481, dated October 10, 1911.

In former applications it has been stated that indigo of extremely fine division is obtained by oxidating indigo-leuco compounds, solutions of indoxyl or indigo-white in presence of aromatic sulphonic acids or carboxylic acids, for instance, those which contain the benzyl residue. The inventor has now found that this invention can be utilized for the manufacture of preparations of indigo-white or of salts of indigo-white such as are also particularly suitable for the cold vat, for instance, especially for the so-called cold sugar- or fermentation-vat; the characteristic points of this invention being as follows: The indigo-white preparations as they are, for instance, manufac-

tured particularly for eastern countries in the form of indigo-white or alkali-carbohydrate preparations of indigo-white of high percentage (see U. S. Patent No. 906,307) possess several advantages over the indigo preparations already on the market, the most remarkable being that it is not necessary for the dyer to subject the material to a reducing process which, apart from being expensive for a small concern, is very much dependent as regards its success on the more or less fine subdivision of the indigo. Now, while employing such preparations in the vat and during the working of the vat there is occasion for a partial re-oxidation of the indigo-white in the vat into indigo. Furthermore, if one examines such an indigo, which may be produced either from carbohydrate solution of indigo-white or from an organic vat or simply from an alkali solution of indigo-white by extracting it with air, it is found that the indigo has separated in very coarse crystals which cannot at all be easily attacked. Thus, a long time is required until a small test quantity of indigo separated and filtered in the above-mentioned manner, and put and divided in a test-tube with about 10 ccm. of freshly prepared mixture of equal parts of a 5 per cent. solution of glucose and a 2 per cent. solution of NaHO solution, yields, when standing, a yellow solution without any essential sediment. Therefore, the immediate reduction of the indigo formed by re-oxidation during the working of the vat is not always secured. However, if an indigo-white or an indigo-white alkali preparation is mixed with one of the bodies named in the said patent-applications, for instance, with a benzylaniline-sulphonate, it is found that the indigo which may form during the working of the vat is in such a finely divided, *i.e.*, colloid-like form, that an extremely quick reduction takes place. Thus suitable preparations are, for instance, obtained by adding to the indigo-white, or indigo-white alkali, or a preparation containing a saccharine substance, as described in U. S. Patent No. 906,307, a salt of benzylsulphanilic acid, or by introducing the salt during the manufacture of the indigo-white preparations; thus, for in-

stance, when using 5 per cent., 10 per cent., or 15 per cent. of the salt of benzylsulphanilic acid proportionately to the indigo-white in the manufacture of the preparations described in U. S. Patent 906,307.

DIAZOTIZABLE GREEN AZO DYE.

August Blank and Matthias Latten, of Leverkusen, near Cologne, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,006,051, dated October 17, 1911.

The inventors have found that para-aminobenzene-azo-1-amino-8-naphthol sulphonic acids, produced, *e.g.*, by combination of para-nitro-diazobenzene chloride with 1-amino-8-naphthol sulphonic acids in acid solution and by reduction of the compounds thus produced, or by combination of diazotized acidyl-para-diamines with the said acids and subsequent saponification of the compound thus obtained, can be converted into ureas by treating them with phosgene in the presence of alkalis or of salts acting like alkalis.

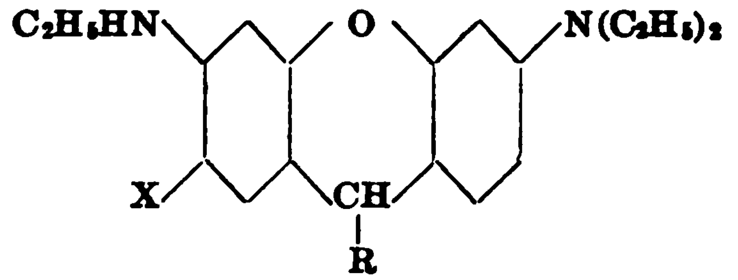
The claims specify the product which is the urea of para-aminobenzene-azo-1-amino-8-naphthol-4.6-disulphonic acid. This dyes cotton brown shades which, on being developed on the fibre with diazotized nitraniline, yield green shades of excellent fastness to light and washing which can be readily discharged.

RED ACID DYESTUFF OF THE TRIPHENYLMETHANE SERIES AND PROCESS OF MAKING THE SAME.

Wilhelm Emmerich, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,006,738, dated October 24, 1911.

The inventor has found that valuable asymmetrical red acid dyestuffs of the triphenylmethane group can be obtained by condensing the benzaldehyde disulphonic acids with one molecular proportion of a monoalkylamino-phenol and one molecular pro-

portion of a dialkylaminophenol. The leuco compounds of these dyestuffs have the general formula:



wherein X stands for an alkyl group or hydrogen, R for a residue of benzoldisulphonic acid. These dyestuffs dye wool and silk very pure red tints while leaving intermixed cotton threads undyed. The tint of the dyestuffs thus produced lies between the tints of the corresponding symmetrically constituted dyestuffs. These dyestuffs by reason of their excellent solubility have a great advantage over the symmetrical dyestuffs obtainable from aldehydedisulphonic acids and monoalkylaminophenols, which are rather difficultly soluble. The fact that the asymmetrical dyestuffs are of much better solubility than a mixture of the di- and tetralkyl-dyestuffs yielding the same tint, proves that the said products are homogeneous chemical compounds.

The claims specify the dyestuff obtained from benzaldehyde disulphonic acid, di-ethyl-m-amino-phenol and mono-ethyl-amino-cresol.

AZO DYE.

Hans Freimann, of Stockum, near Dusseldorf, Germany, assignor to Company Carl Jäger G. M. B. H. Patent No. 1,006,929, dated October 24, 1911.

This invention relates to cotton azo dyes derived from sulpho-m-diamine-dicarbonyl-dioxy-dinaphthylamine-disulphonic-acid.

It has now been discovered that the sulphonic-acids of any m-diamine of the benzol group under the action of phosgene unite with the amidonaphthol-sulphonic-acids, in which the hydroxyl and amide groups are in neither the ortho nor the para position with regard to one another, and form a double

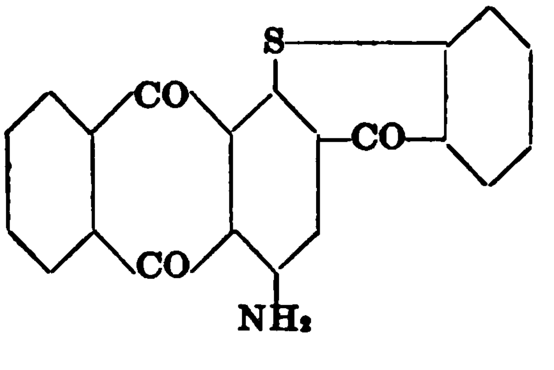
urea. Thus from one molecule of toluylene-diamine-sulphonic acid 1: 2: 6: 4 and two molecules of 2: 5-amido-naphthol-7-sulphonic acid, a double urea is obtained.

These new substances may be combined with two molecules of a diazo compound to form a valuable orange to bluish-red dye which acts directly on cotton and is proof against organic acids and diluted mineral acids. Organic acids are without influence to the dyestuffs and even against diluted mineral acids the fastness remains a superior one.

VAT DYESTUFFS OF THE ANTHRAQUINONE SERIES AND PROCESS OF MAKING SAME.

Max Hessenland, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,007,104, dated October 31, 1911.

The 1.4-chloraminoanthraquinone may be combined with thiosalicylic acid or its derivatives so as to form the corresponding 4-aminoanthraquinonyl-1-thiosalicylic acids, which are red powders. The inventor has found that valuable dyestuffs can be obtained from these 4-aminoanthraquinonyl-1-thiosalicylic acids by treating them with dehydrating agents, such, for instance, as sulphuric acid, chlorosulphonic acid, zinc chloride or the like. These new dyestuffs are anthraquinone-thioxanthone derivatives of the constitution:



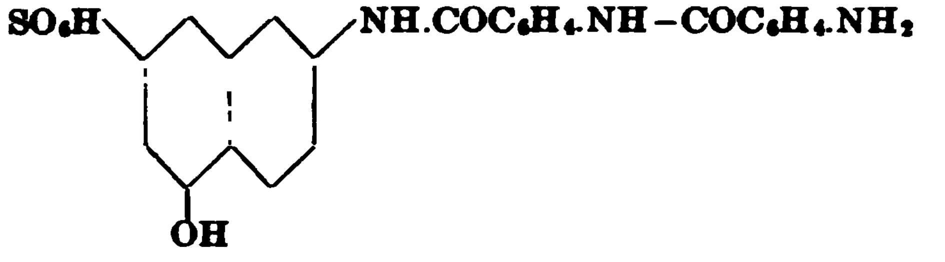
By replacing the hydrogen of the amino group by radicals, such as benzoyl, phenyl, naphthyl, anthraquinonyl, the properties of the dyestuffs can be varied.

The claims specify the 4-amino-anthraquinone-1-thioxanthone which dyes cotton fast blue shades.

AMINOBENZOYLAMINOBENZOYL-2-AMINO-5-NAPHTHOL-7-SULPHONIC ACID.

Wilhelm Neelmeier, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent reissue No. 13,304, dated October 31, 1911.

This invention relates to the manufacture and production of compounds valuable for the production of dyestuffs which can be obtained by condensing nitrobenzoylhalogenides, such as ortho-, para- or meta-nitrobenzoyl-chloride with ortho-, meta- or para-aminobenzoyl-2-amino-5-naphthol-7-sulphonic acid and by reducing the condensation products thus obtained. These new products of the formula:



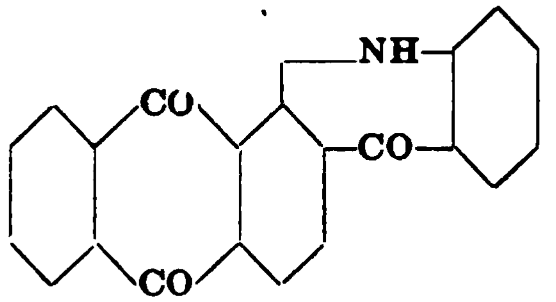
are distinguished by the remarkable property, that they have the same affinity for the fibre, as the so-called substantive dyes and that they can be fixed on the fibre in the same way as these colors. Cotton thus prepared can be combined with diazo compounds, or can be diazotized and combined with azo-dyestuff components.

VAT DYES OF THE ANTHRAQUINONE SERIES.

Wilhelm Herzberg and Walter Bruck, of Schöneberg, near Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 1,008,906, dated November 14, 1911.

According to this invention new valuable vat dyes of the anthraquinone series are obtained by brominating a so-called anthraquinone acridone, which acridones on their part can be obtained by the action of a dehydrating agent upon an ortho-

carboxyphenylamino-anthraquinone, obtaining thus, for instance, a body of the following formula:



if starting from alpha-chloroanthraquinone and anthranilic acid. In order to brominate such an anthraquinone acridone one may proceed by one of the methods usual for this purpose; for instance, the parent material may be mixed with a suitable solvent, such as nitrobenzene, and acted upon with bromine while heating. The new dyes thus obtained produce on cotton from a vat containing a hydrosulphite and an alkali red to bluish-red to blue tints which are clear and intense and possess a very good fastness.

The claims specify the product from alpha-beta-anthraquinone.

MONOAZO DYE.

Wilhelm Herzberg and Max Ronus, of Berlin, and Franz Schwabe, of Charlottenburg, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 1,008,907, dated November 14, 1911.

The inventors have found that new valuable red monoazo dyes are obtained, which dye wool from an acid bath red tints, which are distinguished by their levelling power and excellent fastness to light, acids, and steaming. These new dyes are manufactured by combining the 4-nitrodiazobenzene-2-sulphonic acid with a 1.3-diaminobenzene-5-sulphonic acid, substituted in the 2-position by a negative substituent. Such compounds are 1.3-diamino-2-halogenbenzene-5-sulphonic acids and 1.3-diaminobenzene-2.5-disulphonic acid.

The claims specify the monoazo dye derived from 4-nitrodiazobenzene-2-sulphonic acid and 1.3-diaminobenzene-2.5-disulphonic acid, which dyes wool from an acid bath red shades.

VAT DYES OF THE ANTHRAQUINONE SERIES.

Wilhelm Herzberg and Walter Bruck, of Schöneberg, near Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 1,008,908, dated November 14, 1911.

This invention relates to the manufacture of new vat dyes of the anthraquinone series derived from a so-called anthraquinone-acridone and possessing an acidylamino group in the benzene nucleus. These new dyes produce on cotton from a vat containing a hydrosulphite and an alkali, generally speaking, violet tints, which on subsequent treatment with a hot soap solution change to blue tints of an excellent fastness. These new dyes may be manufactured by nitrating an anthraquinone-acridone, reducing the nitro compound thus obtained, and finally substituting in the amino group the residue of an organic acid for a hydrogen atom. Another way consists in acting with an anthraquinonehalogen-acridone upon the amide of an organic acid.

The claims specify the dyestuff which is anthraquinone-benzoyl-amino-acridone:

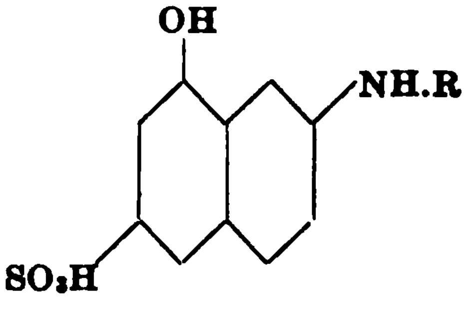
$$C_6H_4\left\langle\begin{matrix}CO\\CO\end{matrix}\right\rangle C_6H_4\left\langle\begin{matrix}NH\\CO\end{matrix}\right\rangle C_6H_4.NH.CO.C_6H_5$$

BLUISH-RED AZO DYE.

Oscar Günther, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,009,740, dated November 28, 1911.

This invention relates to the manufacture and production of new azo dyes which dye cotton from red to violet-red shades fast to light. The process for their production consists in combining the tetrazo compound of para-para′-diaminodiphenylurea-meta-

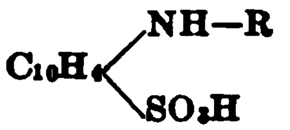
meta′-disulphonic acid in acid or neutral solution with one molecule of a 2-amino-8-naphthol-6-sulphonic acid compound:



(R is hydrogen which may be replaced by a substituent, *e.g.*,

$$—CH_3, —C_2H_5, —C_6H_5, —C_6H_4—CH_3,$$

etc.) as one component and with one molecule of a beta-naphthylamine sulphonic acid compound:



(R = H which may be replaced by an alkyl, *e.g.*, $—CH_3$, $—C_2H_5$, $—CH_2—C_6H_5$, etc.) The diazotized urea compound can also be combined with two molecules of the same or of two different beta-naphthylamine sulphonic acid compounds above mentioned. The order in which the combination is carried out does not affect the result.

The claim specifies the product from beta-methyl-amino-naphthalene-7-sulphonic acid.

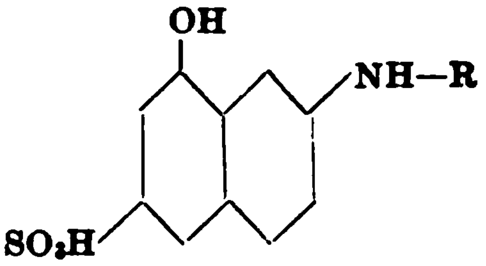
RED-VIOLET COLORING MATTER.

Oscar Günther, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent 1,009,741, dated November 28, 1911.

This invention relates to the manufacture and production of new azo dyes which dye cotton from red to violet-red shades fast to light.

The process for their production consists in combining the tetrazo compound of para-para′-diaminodiphenylurea-meta-

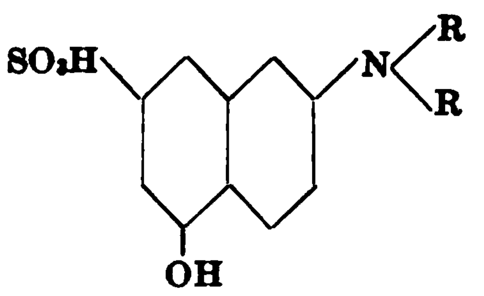
meta'-disulphonic acid in acid or neutral solution with one molecule of a 2-amino-8-naphthol-6-sulphonic acid compound of the formula:



(R = H which may be replaced by a substituent, *e.g.*,

$$—CH_3, —C_2H_5, —C_6H_5, —C_6H_4—CH_3,$$

etc.), as one component and in alkaline or neutral solution with a 2-amino-5-naphthol-7-sulphonic acid compound of the formula:



(R means H which may be replaced by a substituent, one H must always be a substituent, *e.g.*,

$$—CH_3, —C_2H_5, —C_6H_5, —C_6H_4—CH_3)$$

as second component.

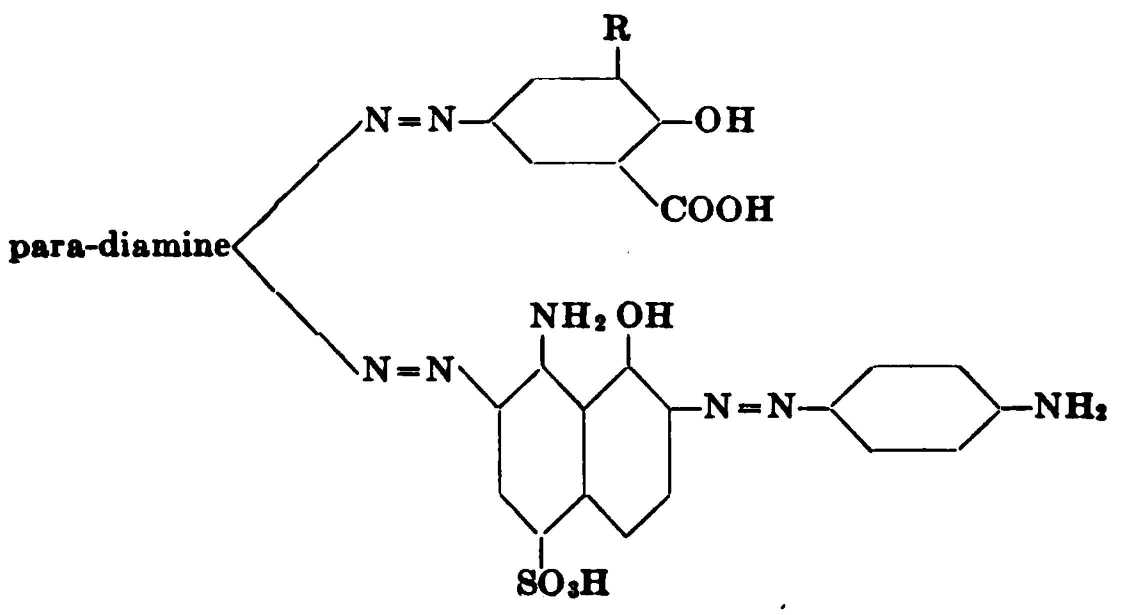
The claims specify the product resulting from 2-amino-8-naphthol-6-sulphonic acid and 2-phenylamino-5-napththol-7-sulphonic acid.

DIAZOTIZABLE DYE.

Carl Heidenreich, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,009,745, dated November 28, 1911.

Green substantive dyestuffs capable of being diazotized could hitherto not be obtained, though they are of great technical interest for completing the series of shades and for modifying the shades produced by other dyestuffs capable of being diazo-

tized. The inventor claims such dyes capable of dyeing cotton green to olive-green shades can be produced in the following way: 1 molecule of a tetrazotized para-diamine of the benzidine series and 1 molecule of an aromatic oxycarboxylic acid such as salicylic or cresotinic acid are combined together to form the intermediate compound which is then further combined with 1.8-aminonaphthol-4-sulphonic acid in an acid suspension. The resulting coloring matter is then combined in alkaline solution with the diazo compound prepared from acidyl-para-phenylene-diamine or from para-nitraniline and finally the trisazo dye-stuff is saponified or the nitro group therein contained reduced. The dyestuffs thus obtained of the formula:



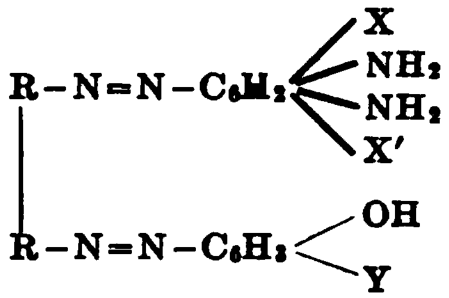
in which formula R means an atom of hydrogen which may be substituted by the methyl group, dye cotton in green shades, which, on being diazotized and developed with beta-naphthol or meta-phenylenediamine, are very little changed, but are rendered fast to washing by this process.

The claims specify the dyestuff obtained by using benzidine as a starting point.

BROWN AZO DYE.

Wilhelm Bergdolt, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,009,952, dated November 28, 1911.

The inventor claims that new and valuable azo dyes having most probably the formula:



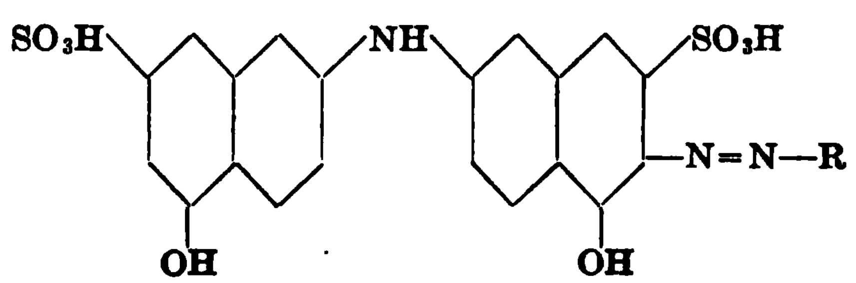
($R =$ an aryl, *e.g.*, C_6H_4—, —C_6H_3—NO_2, —C_6H_3—CH_3, —C_6H_3—OCH_3; $X = H$ or SO_3H; $X' = H$ or CH_3; $Y = H$ or OH) can be obtained by combining the tetrazo compounds of a para-diamine of the benzidine series such as benzidine, tolidine, nitrobenzidine, dianisidine, with one molecule of a diamine, *e.g.*, toluylenediamine, meta-phenylenediamine, meta-phenylenediamine sulphonic acid and one molecule of a phenol such as phenol or resorcine.

Very valuable yellowish-brown shades fast to washing are obtained by treating with diazotized nitranilines cotton dyed with these new dyes. The shades thus obtained are especially valuable for the reason that they can be remarkably will discharged to a pure white.

MONOZA DYE.

Hugo Schweitzer, of Elberfeld, and Arthur Zart, of Vohwinkel, near Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,009,796, dated November 28, 1911.

The present invention relates to the manufacture and production of new azo coloring matters having most probably the formula:



R meaning a naphthol sulphonic acid, such as 5-naphthol-7-sulphonic acid or 6-naphthol-3-sulphonic acid.

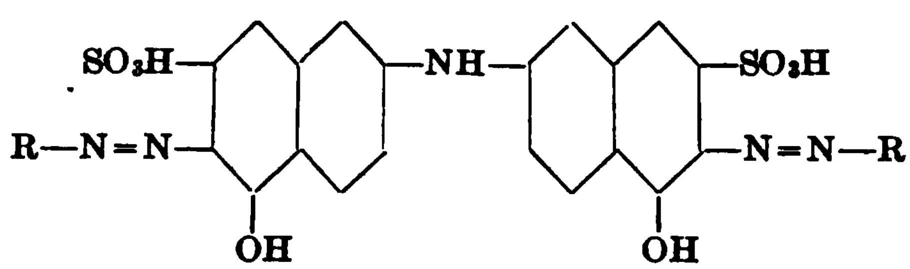
The new dyes are obtained by combining the diazo compounds prepared from an aminonaphthol sulphonic acid, *e.g.*, 2.5.7-, 1.5.7- or 1.6.3-aminonaphthol sulphonic acid with the 5.5′-dioxy-2.2′-dinaphthylamine-7-7′-disulphonic acid.

The claims specify the dyestuff from 2.5.7-amino-naphthol sulphonic acid. It dyes cotton reddish-violet. The shade after being developed with diazotized para-nitraniline is bluish-violet fast to washing. It can be discharged to a pure white.

DISAZO DYESTUFF.

Hugo Schweitzer, of Elberfeld, and Arthur Zart, of Vohwinkel, near Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,009,797, dated November 28, 1911.

The present invention relates to the manufacture and production of new azo coloring matters having most probably the formula:



R meaning a naphthol sulphonic acid, such as 5-naphthol-7-sulphonic acid or 6-naphthol-3-sulphonic acid.

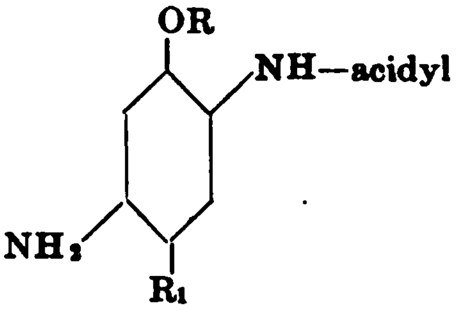
The new dyes are obtained by combining two molecules of the diazo compounds prepared from an aminonaphthol sulphonic acid, *e.g.*, 2.5.7-, 1.5.7-, or 1.6.3-aminonaphthol sulphonic acid with the 5.5′-dioxy-2.2′-dinaphthylamine-7.7′-disulphonic acid.

The claims specify the dyestuff from 1.6.3-aminonaphthol sulphonic acid. It dyes cotton violet. The shade after being developed with diazotized para-nitraniline is a pure violet fast to washing. It can be discharged to a pure white.

BLUE TRISAZO DYE.

Heinrich Jordan and Wilhelm Neelmeier, of Leverkusen, near Cologne, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,010,433, dated December 5, 1911.

The present invention relates to the manufacture and production of new azo dyestuffs which are obtained by combining the diazo compounds prepared from 5-amino-2-acidylamino-1-phenol ethers of the formula:



(R meaning an alkyl, *e.g.*, methyl or ethyl, R_1 meaning a substituent, such as chlorine, alkyl) with 1-naphthylamine-6- or 7-sulphonic acid (or a mixture of these acids), rediazotizing the aminoazo compounds thus obtained, combining the diazoazo compounds with a second molecule of one of these acids (or of a mixture of the same), rediazotizing the aminodisazo compounds thus produced and combining the diazodisazo compounds with a naphthol sulphonic acid, especially 1.3- and 2.7-naphthol sulphonic acid and finally eliminating the acidyl radical by saponification. Blue cotton dyestuffs are thus obtained. They can be diazotized on the fibre and developed, *e.g.*, with beta-naphthol the result being bright shades of excellent fastness to washing, which can be discharged with hydrosulphite to a pure white.

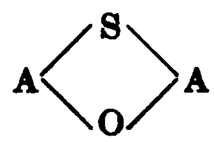
The claim specifies the product from 2-oxalyl-amino-4-chloro-5-amino-1-anisol, two molecules of 1-naphthylamine-6-sulphonic acid and 1-naphthol-3-sulphonic acid.

VAT DYE.

Paul Thomaschewski, of Vohwinkel, near Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,010,463, dated December 5, 1911.

This invention relates to the manufacture and production of new vat dyestuffs of the anthraquinone series. The process for their production consists in condensing by means of sulphonic acid anthraquinone mercaptans with oxyanthraquinones.

The new dyes are after being dried and pulverized reddish to brown powders soluble in concentrated sulphuric acid, generally with from a green to greenish-blue coloration; dyeing cotton from an alkaline hydrosulphite vat from red to orange to brown shades and possess probably the following general formula:



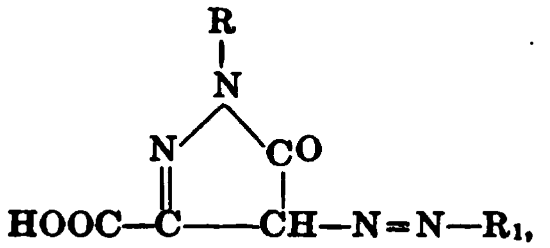
in which A means an anthraquinone radical.

The claims specify the product from oxyanthraquinone and anthraquinone-1-mercaptan, which dyes yellow-red shades.

PYRAZOLONE DYES AND PROCESS OF MAKING THEM.

Paul Julius and Ernst Fussenegger, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin & Soda Fabrik. Patent No. 1,010,919, dated December 5, 1911.

The inventor claims that 3-brom-2-amino-1-methyl-benzene-5-sulphonic acid can be employed in the production of new coloring matters which possess a constitution corresponding to the formula:



in which either R, or R_1, or both, represent the 2-methyl-6-brom-benzene-4-sulphonic acid residue. The coloring matters of the

formula in which R and R_1 both represent the said residue can be obtained, for instance, by combining dihydroxy-tartaric acid with two molecular proportions of the hydrazine of 3-brom-2-amino-1-methyl-benzene-5-sulphonic acid. It is preferred to produce those in which R and R_1 differ from one another by acting with a hydrazine on oxalyl-acetic ester and then upon the compound containing the pyrazolone ring formed with a diazo compound.

For the purposes of the invention, either the hydrazine, or the diazo, compound, of both, must be derived from the 3-brom-2-amino-1-methyl-benzene-5-sulphonic acid. The coloring matters so obtained yield particularly greenish shades of yellow and are also very fast against the action of light.

The coloring matters containing the 2-methyl-6-brom-benzene-4-sulphonic acid group twice possess exceptionally greenish shades of yellow when in the form of lakes.

VAT DYE.

Arthur Lüttringhaus, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 1,010,930, dated December 5, 1911.

The inventor has discovered a new vat coloring matter of the anthracene series which can be obtained by condensing 1-halogen-anthraquinone-2-carboxylic acid with 3.4-dichloraniline, and then subjecting the product so obtained to a further condensing action, so that the elements of water are removed and ring formation takes place. The condensation can be effected, for instance, by means of concentrated sulphuric acid or thionyl chloride or phosphorus pentachloride and aluminium chloride. It dyes cotton from the hydrosulphite vat red shades.

VAT DYE.

Arthur Lüttringhaus, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 1,011,068, dated December 5, 1911.

The inventor has discovered a new vat coloring matter of the

anthracene series which can be obtained by condensing 1-halogen-anthraquinone-2-carboxylic acid with beta-naphthylamine and then subjecting the product so obtained to a further condensing action, so that the elements of water are removed and ring formation takes place. The condensation can be effected, for instance, by means of thionyl chloride, or phosphorous pentachloride. It dyes red shades on cotton from the hydrosulphite vat.

AZO DYE FOR WOOL.

Hugo Geldermann, of Gross-Lichterfelde-Ost, near Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 1,011,770, dated December 12, 1911.

This invention relates to the manufacture of new azo dyes which are especially adapted for dyeing wool in combination with chrome mordants, and may be obtained by combining diazotized 2-aminophenol derivatives containing negative substituents with 2-naphthol-4-sulphonic acid. The dyes thus manufactured produce on wool in combination with a suitable chrome mordant black tints of a good fastness.

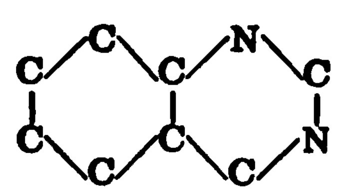
The claims specify the product from 6-nitro-4-chloro-2-aminophenol.

AZO DYESTUFF.

Marston Taylor Bogert, of New York, N. Y. Patent No. 1,012,055, dated December 19, 1911.

The claims cover:

1. The process of producing azo dyestuffs by coupling a diazotized aromatic compound with compounds containing the following quinazoline nucleus:



all of which dyestuffs contain the group Ar—N: N—Q, in which Ar is an aromatic nucleus and Q is the quinazoline coupler used.

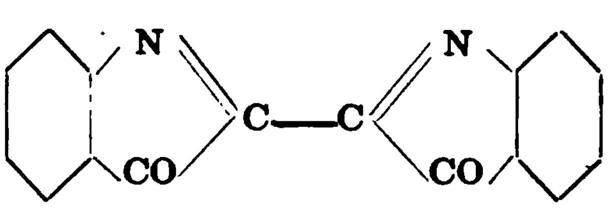
2. As an article of manufacture, an azo dyestuff which contains the group Ar—N : N—Q in which Ar is an aromatic nucleus and Q is the quinazoline coupler used, and which, when reduced with stannous chloride and hydrochloric acid, gives an amido quinazoline compound in which the amido group is attached to the benzole portion of said quinazoline nucleus.

INDIGO COLORING MATTER AND DERIVATIVES THEREOF AND PROCESS OF MAKING THEM.

Ludwig Kalb, of Munich, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 1,012,363, dated December 19, 1911.

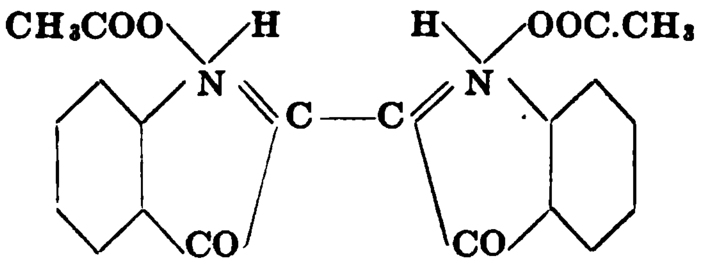
This invention relates to the manufacture, production, and use of dehydro derivatives of indigo coloring matters.

The inventor claims that a new oxidation product of indigo can be obtained if the oxidation be carried out in the absence of water and in the presence of an indifferent suspension agent, such as benzene, chloroform, or nitrobenzene. The dark yellowish-red solution produced contains an oxidation product of indigo which, according to analysis and determination of molecular weight, consists of dehydroindigo of the formula



In carrying out this oxidation, it is found that silver oxide, lead dioxide, manganese dioxide, and permanganates are particularly suitable and the oxidation produces better results when a small addition of an anhydrous acid, such, for instance, as glacial acetic acid, benzoic acid, or hydrogen chloride, which is soluble in the suspension agent used, is added. The addition of a drying agent, such, for instance, as calcium chloride, is also of advantage. In contradistinction to indigo, dehydro-indigo is easily

soluble in many indifferent solvents. It has a basic character and can be precipitated from its solutions by the addition of anhydrous acids and thus obtained in the form of difficultly soluble salts possessing a yellow-green to grayish-green color. The oxyaceto-indigotin obtained by O'Neill is such a salt, and its constitution would probably be more correctly indicated by the formula



and it should then be termed dehydroindigo acetate. If during the oxidation of indigo in the presence of an indifferent solvent, an excess of acid be used, these salts of dehydroindigo can be directly obtained.

DYE.

Georg Holster, of Vohwinkel, near Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,012,853, dated December 26, 1911.

The inventor found that new and valuable products having most probably in the shape of their sodium salts the formula:

$$CO\begin{cases} NH.C_6H_3.SO_3Na.NH.OC.C_6H_4NH_2 \\ NH.C_6H_3.SO_3Na.NH.OC.C_6H_4NH_2 \end{cases}$$

can be obtained by condensing nitrobenzoyl chlorides with diaminodiphenylureadisulphonic acid and reducing the products thus obtained.

The new products are distinguished by the remarkable property, that they have the same affinity for the fibre as the so-called substantive dyes and that they can be fixed on the fibre in the

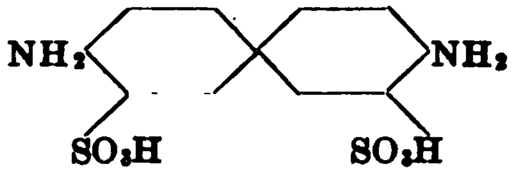
same way as these colors. Cotton thus prepared can be diazotized on the fibre and combined with suitable azo-dyestuff components.

Beta-naphthol furnishes a fast red, 1-phenyl-3-methyl-5-pyrazolone, and a greenish-yellow fast to light, washing, and cross-dying.

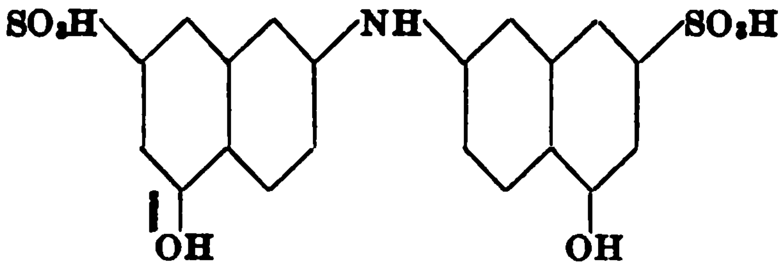
BLUISH-VIOLET DISAZO DYE.

Arthur Zart, of Vohwinkel, near Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,012,960, dated December 26, 1911.

The present invention relates to the production of a new disazo coloring matter capable of dyeing cotton in pure bluish-violet shades which are distinguished for their good fastness to ironing. The process for its production consists in combining 1 molecule of the tetrazo compound prepared from benzidine-ortho-ortho-disulphonic acid



with 2 molecules of the 5.5′-dioxy-2.2′-dinaphthylamine-7-7′-disulphonic acid



II.—PROCESSES OF APPLICATION.

PROCESS OF SCOURING WOOL.

Peter Schmid, of Basel, Switzerland. Patent No. 981,008, dated January 10, 1911.

The scouring of wool in form of flocks, fleeces, slivers, threads, webs, cloths, net-works, knittings, etc., as usually carried out, is based on the treatment of the wool with a cold or hot, alkaline or soapy, liquid bath. This treatment of the wool with a liquid bath has certain disadvantages which can be avoided, the inventor claims, by substituting for the liquid bath at present employed a bath or lather of soapy water which may or may not contain an alkali, an alkaline salt, or other known scouring ingredient.

In order to prepare such a lather bath, an aqueous soapy solution is introduced into a scouring vessel, or vat, provided at its bottom with a heating coil, the said solution being then heated to the boiling point by feeding the said coil with steam, or other heating agent, capable of maintaining the soapy solution in ebullition. The upper part of the vat or vessel will thus be filled with a lather bath, which will remain, or be maintained, as long as the heating of the soapy solution is continued. The wool to be scoured is manipulated in this lather bath, or conducted through this latter, in such a manner that it cannot come into contact with the soapy liquid. This latter may have the same concentration as the liquid scouring baths at present used and contain, besides the soap, other scouring ingredients.

TREATMENT OF ACETYL CELLULOSE TO ENHANCE ITS ELASTICITY AND ITS POWER OF ABSORPTION FOR DYESTUFFS.

Emil Knoevenagel, of Heidelberg, Germany. Patent No. 981,-574, dated January 10, 1911.

Experiments have shown, that by treating the acetyl-cellulose with solutions of inorganic acids a modification of the surface may be produced similar to that obtainable by mixtures of organic compounds and their aqueous solutions, which modification shows itself chiefly by a strong swelling or increase of volume. This swelling is accompanied by a large increase of the power of absorption for dyes in dyeing by known methods. In the same manner the power of absorbing amines and phenols is enhanced, which bodies may then be converted into dyes on the fibre by known methods, or which have already the nature of dyes and whose color may be deepened on the fibre by known methods. At the same time this treatment of acetyl-cellulose with solutions of inorganic acids enhances considerably the elasticity of acetyl-cellulose, although it is not possible to prove any appreciable hydrolytic decomposition of the acetyl-cellulose treated in this manner, and the same treatment also produces a bleaching effect. The property of acetyl-cellulose of being dyed easily, remains unimpaired after this treatment with solutions of inorganic acids, even if the solutions of inorganic acids are afterward completely removed by washing, for instance, with water.

The claims specify the use of hydrochloric acid for the purpose.

PROCESS OF BUCKING OR BLEACHING VEGETABLE FIBRES DYED WITH VAT DYESTUFFS.

Friedrich Carl Theis, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 983,951, dated February 14, 1911.

Vegetable fibres dyed with vat dyestuffs have the drawback of bleeding into the white parts when they are bucked with caustic soda, carbonate of soda, and the like, which is often necessary in bleaching dyed fabrics. It has been attempted to remedy this disadvantage by different means, for instance, by adding permanganate or bichromate to the lye. Thus the bleeding of the dye into the undyed fibres (spun or woven) has been prevented, but the fibres were stained by precipitates of metallic oxide and had then to be bleached by treatment with an acid. For instance, in French Patent No. 392,858 is described a process for bucking material dyed or printed with vat dyestuffs, which consists in adding easily reducible substances to prevent the bleeding of the dye, for which purpose exclusively certain organic compounds are used, whereas the process of the present invention consists in using a certain inorganic body which, contrary to the other inorganic substances which have been hitherto tried, prevent the bleeding of the dye without staining the white portions of the material. The inventor has now found that the bleeding can be prevented in the bucking process—whether it be carried out in the vat or under pressure—and the dyeings themselves protected, by introducing into the lye alkali bromates.

PROCESS OF CALICO PRINTING.

Frederick Davis, of Wiswell, near Whalley, England, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 984,-545, dated February 21, 1911.

This invention relates to improvements in calico printing, and has for its object to produce certain novel colored resist effects in printing indigo and other vat colors.

In carrying the invention into effect the cloth may or may not be prepared with glucose in the ordinary way for indigo printing. Then print with a resist paste containing sulphur, such as is ordinarily used for producing a white resist effect under printed indigo, to which is added a sulphuric color, or a suitable vat dyestuff, or mixture of the same. Next print, pad,

or otherwise cover with any suitable indigo printing color, for instance, the customary color containing indigo and caustic alkali when the cloth is prepared with glucose, or the customary color containing indigo, caustic alkali, and a suitable hydrosulphite when the cloth is not so prepared, or with similar printing colors prepared from other vat dyes, or mixtures thereof, the final result after development in either case being that where the sulphur resist is printed the fixation of indigo blue or other printing color is prevented, while where the printing color falls upon the sulphur resist color the coloring matter contained in the latter is fixed upon the fibre. This novel and useful effect is due to the combination of two well-known effects—the resisting action of sulphur on indigo, or other printing color, and the fixation of sulphur colors by the simultaneous action of alkali and sulphur under suitable conditions, the fixation being presumably due to the intermediate formation of alkali sulphides.

PROCESS OF RENDERING RAMIE AND OTHER FABRICS WATER-REPELLENT AND COLORING THE SAME.

Alice Marion Hart, of Chelsea, London, England. Patent No. 984,665, dated February 21, 1911.

By this process yarns and fabrics of ramie can be dyed any color by the use of cheap dry pigment, without the application of dyestuffs, the particles of color being conveyed into the very structure of the fibre. The same treatment is successful with other yarns and textiles, such as cotton, linen, jute, and the like.

In carrying out this invention, the dry pigment is first prepared by boiling in water for about one hour, the coloring matter is then allowed to settle, the surplus water decanted, and the residue dried with gentle heat, leaving it ready for use.

The following is the mixture, in or about the proportions given, for the treatment of the yarns and fabrics. Take of gum tragasol, one pound and work into it an equal weight of water.

Mix three pounds of caseine slowly with water till quite smooth, Add the caseine to the gum, and work in one pint of sweet oil, and half a pint of caustic soda Twaddell 17. Finally mix one pound of the dry color into a smooth paste with water and add it to the mixture, then bring up the whole with water to two gallons in amount. Boil the mixture for about one hour, stirring the whole time. The yarns and fabrics are passed through the mixture, then through rollers into a bath of water containing 15 per cent. of alum, thence into a trough of clean water, and again through rollers, and then dried by hanging up.

If colored or white goods are treated the pigment is omitted.

PROCESS OF TREATING TEXTILE MATERIALS.

Robert Weiss, of Kingersheim, Germany. Patent No. 986,-332, dated March 7, 1911.

According to this invention, the process consists of subjecting by periodical successions the textile material to three different successive operations with one and the same liquid in such a way that the material is first impregnated in full bath by forcing the liquid through it preferably in a direction from below to above, then, after reversing the direction of circulation, drained almost completely by aspiration from below and further moistened from above so as to be traversed from above to below only by a kind of percolating or filtering action, in order to be more capable of absorbing liquid on the next reversion of circulation in view of a repeated pull impregnation of the material. In this way are obtained by periodical successions first a thorough impregnation of the material in full bath, then a draining of the material with subsequent percolation of liquid through the latter so as to render the material more able of absorbing liquid on the next reversion of the circulation, afterward a new thorough impregnation of the material in full bath, when the circulation is reversed, and so on. The fact that the material is drained almost completely and then reimpregnated thoroughly

insures a thorough, rapid, and economical treatment of the material.

The new process is preferably carried out alternately in two closed- or open-treating vessels, by using a quantity of liquid only slightly greater than that corresponding to the treatment of the material in one single vessel, in such a manner that, while in one of the vessels the thorough impregnation of the material is effected in full bath, simultaneously the draining of the material in the other vessel takes place by aspiration of the liquid from the lower part of this vessel.

PROCESS OF DYEING.

Paul Besnier, of New Orleans, Louisiana. Patent No. 988,300, dated April 4, 1911.

The invention consists of a preparation which, when added to the dye, will act on the tissue of the fabric in such a manner as to make it take the dye and retain the color in a manner far superior to that obtained by any other process, with less handling, less rinsing, less labor, and also less dye, thus greatly economizing both time and expense.

The invention in brief comprises a new preparation and process of using same in dyeing fabrics, and by this invention cotton fabrics can be dyed a true and fast black, and also wool and silk.

In carrying out the invention a fixing powder composed of common salt, Glauber salt, lye, and naphthalene is prepared. These ingredients are chemically known as chloride of sodium ($NaCl$); sodium sulphate ($Na_2SO_4 + 10H_2O$); carbonate of potash (K_2CO_3), and naphthalene ($C_{10}H_8$). Use preferably the following proportions of these ingredients by weight: 25 parts salt, 10 parts Glauber salt, 1 part lye, 1 part naphthalene. These ingredients are mixed together, heated gently and stirred briskly, and then allowed to cool. The mixture when cold is in the form of a coarse powder.

PROCESS OF DYEING.

René Ott, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 989,186, dated April 11, 1911.

The hitherto known process of dyeing the vegetable fibre with alizarine and other oxyanthraquinone dyestuffs generally consists of three separate operations: 1, oiling the fibre; 2, mordanting the oiled fibre; 3, dyeing the oiled and mordanted fibre. The dyed fibre is then frequently steamed and finally cleared. The steaming process is sometimes omitted and the clearing effected after the dyeing.

The inventor has discovered a new process by which the mordanting and dyeing can be carried out in a single operation and in the same bath by dyeing from a bath containing the dyestuff, the mordant, and approximately one part of a salt to every 100 parts of water. A great variety of salts may be used, but care has to be taken not to select any which might react with the mordant or dye or might otherwise injure the result. The following salts may be used: $NaCl$, Na_2SO_4, KCl, NH_4Cl, K_2SO_4, etc.

This process of treating the vegetable fibre has the great advantage of rendering the separate mordanting operations unnecessary. In this way much labor is saved, because the mordanting of the fibre in most of the cases does not only require several treatments of the fibre with the mordants, but also necessitates intervening drying of the goods and precipitation of the mordant on the fibre. By the addition of the large quantity of salts to the dye bath the dye bath is kept clear until almost the end of the operation, because the salts practically prevent the formation of insoluble color lakes in the bath. The shades thus obtained are, therefore, bright, clear, and strong and the apparatus in which the dyeing operation is performed remains clean and free from the dirty precipitates due to the formation of insoluble color lakes.

PROCESS OF MANUFACTURING ARTIFICIAL THREADS.

Ernst Bechtel, of Hanau, Germany, assignor to the firm of Hanauer Kunstseide-Fabrik G. M. B. H. Patent No. 988,430, dated April 4, 1911.

As is known in the art, the solution of cellulose with ammoniuretted cupric oxide heretofore used in the manufacture of artificial threads has the tendency to coagulate into drops when flowing out from a receptacle in a fine stream. Therefore, it was necessary, in order to make threads, to force the said solution through very fine apertures. It was also necessary to keep the solutions at low temperatures.

The object of the present improvements is to provide a process in which the use of such fine apertures and of the low temperatures is dispensed with. For this purpose, substances of a slimy or gelatinous nature are added to the said solution of cellulose, by which the tendency of the solution to coagulate into drops is removed, so that it can be spun into threads in a similar way as honey. The substances which have proved particularly useful for the said purpose are sodium ricinoleate, glycerine, or gelatine. By adding substances of the character described to the solution of cellulose with ammoniuretted cupric oxide the capillary tubes heretofore necessary for spinning the said solution, and the filtration of the solution are dispensed with, because even foreign matter of comparatively large size does not prevent a continuous spinning of the threads by tearing the latter, and, furthermore, the pliability and the silky lustre of the threads is improved.

PROCESS OF DYEING HALF-WOOL GOODS.

Hans Walther, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 990,023, dated April 18, 1911.

The inventor claims to have discovered that the substantive

cotton azo dyestuffs, even those which are but scarcely soluble in an acid bath can be used for dyeing the mixed goods. On boiling the cotton is dyed in every depth of shade desired and, in some instances, is even dyed a deeper shade than the wool. In such case the latter has to be finally dyed to shade with a suitable wool dye. This new process is of great importance for the dyeing of half-wool, as both fibres can be dyed a uniform shade by means of it. For dyeing blacks the known black polyazo dyes may be used, *e.g.*, direct deep black E, EW, RW, Pluto black FR, 3B extra, A extra, BS extra, G, CR, direct blue-black B and N, benzo chrome blue-black B, patent dianil black EB, oxydiaminogene, diazo black BHN, diamine deep black CR, formal black; for other colors other substantive cotton azo dyestuffs may be used, *e.g.*, benzo fast scarlet 5BS, benzo chrome-brown BS and B, benzo dark-brown, benzo copper-blue, brilliant azurine 5G, Chicago blue B, cupranil-brown, etc. By neither of these products is the wool dyed a deeper shade than the cotton. But if the wool should show a tendency to assume a deeper shade than the cotton it is only necessary in order to prevent this, to reduce the temperature of the dye bath. To prevent the cotton from being tentered by mineral acid which might adhere to it even after washing it is advisable to use formic acid for acidulating the bath. But other acids, *e.g.*, acetic acid, sulphuric acid, etc., may be used, care, however, being required in the case of mineral acids to wash the goods thoroughly after dyeing.

The allowance of this patent in view of technical practice is strange.

PROCESS OF PRESERVING SILK WEIGHTED WITH METAL SALTS.

Otto Meister, of Zurich, Switzerland, assignor to Weidmann Silk Dyeing Company. Patent No. 991,220, dated May 2, 1911.

This process has for its purpose to give to the weighted silk the property of more effectively resisting deterioration in storage and in use, due to the influences of light, air, and humidity,

without detracting from the feel and lustre of the silk or making it sensitive to iron, with accompanying reddish tinge.

The improved process consists in treating the silk with aldehydes, say, aldehydes of the monohydric alcohols, or with compounds containing the same, for instance, the compound of an aldehyde with bisulphite or with ammonia. The aldehyde (for instance, formaldehyde sodium bisulphite), from 1 to 5 per cent. thereof being used, may be added either to the final wash or in the earlier stages of the mordanting or dyeing processes, although it is to be understood that good results may be obtained without strict adherence to this procedure; for instance, the aldehyde may be applied at any stage of the mordanting and dyeing process, or to the silk threads or even to the goods after the process of manufacturing the same is completed.

PROCESS OF PRESERVING SILK WEIGHTED WITH METAL SALTS.

Otto Meister, of Zurich, Switzerland, assignor to Weidmann Silk Dyeing Company. Patent No. 991,221, dated May 2, 1911.

The improved process consists in treating the silk with the body which results from the reaction of ammonia and formaldehyde—hexamethylenetetramine, with the formula $(CH_2)_6N_4$—from 1 to 5 per cent. thereof being used, and which may be added either to the final wash or in the earlier stages of the mordanting or dyeing processes, although it is to be understood that good results may be obtained without strict adherence to this procedure; for instance, the body referred to may be applied at any stage of the mordanting and dyeing process, or to the silk threads or even to the goods after the process of manufacturing the same is completed. The body referred to—hexamethylenetetramine—and the other aldehyde ammonias are equally operative in preserving weighted silk.

ART OF TREATING SILK.

Solomon B. Rains, of Brooklyn, New York, assignor of one-half to James Keeton. Patent No. 992,803, dated May 23, 1911.

This is a method of boiling off silk in which the material is handled at full length. One or more spools of spun or thrown silk is placed between brackets, and the loose end of the thread is led over the various rollers and through the boiling-off liquor in the tank. From the last of the idler rollers the silk is conducted in proximity to the finishing roll, which is heated to the proper temperature for completely drying and laying the fibre of the thread as it passes. The end of the thread is then led through the conduit and onto the taking-off spool or reel, upon which it is wound in its cleansed and finished condition. In passing through the boiling-off liquor all of the gum and foreign substances are removed and the thread when wound upon the taking-off spool is in finished condition and ready for use as desired.

METHOD OF MERCERIZING COTTON, PREFERABLY IN THE FORM OF SKEINS.

Paul Hahn, of Niederlahnstein, Germany. Patent No. 994,-076, dated May 30, 1911.

According to the present invention the material, preferably in form of skeins, is first stretched, then introduced in such a stretched state into the lye and kept stretched until it is entirely immersed in the lye. Beginning with this moment the stretching rollers are approached to each other and thereby the material is slackened at all parts of its entire length, so that the shrinking can start immediately and uniformly on all parts of the material. The material is therewith preferably moved through the lye, by the rollers being rotated and the skein thereby being made to travel in a slack state over the rollers. When the shrinking process has been completed in this manner, the material is again stretched, preferably while still in the lye, by the distance between the rollers being increased. This stretching may also be carried out outside of the lye; it is, however, advisable to carry it out in the lye, and thereby a part of the liquor absorbed by the fibres is driven out by such stretching

already within the liquor. The further treatment of the stretched material is carried out and completed in a manner showing no novel features.

PROCESS OF BLEACHING AND SOFTENING JUTE FIBRE.

Samuel A. Flower, of New York, N. Y.; Charles E. Flower administrator of said Samuel A. Flower, deceased. Patent No. 994,508, dated June 6, 1911.

The invention consists of the following process:

Take about 100 pounds jute fibre and place in a solution composed of 95 pounds of water, 2 pounds of caustic soda, 2 pounds of chloride of lime, and 1 pound of soap. After heating the jute fibre in the solution for about three hours at 150 degrees F. the mechanical impurities are loosened and the jute pigment is made soluble in water. The fibre is then washed, taken out, and centrifuged. Next it is placed in a second bath composed of a solution of about 90 pounds of water, 7 pounds of chloride of lime, 2 pounds carbonate of soda, and 1 pound of glycerine heated to about 70 degrees F. and allowed to soak for about two hours; the fibres having been thoroughly bleached and resembling cotton in appearance, are then taken out, washed, and wrung out. The product is then treated with a mixture of about 90 pounds of water, 1 pound of glycerine, 6 pounds chloride of lime, 1 pound of soap, and 2 pounds of carbonate of soda, which makes the fibre soft and silky, resembling wool. The material is then placed in a third bath composed of a cold aqueous solution of bisulphite of soda of about 5° Twaddell for about one-half hour. The fibre is then washed and dried, which sets the color thereof. As a further step to make the fibre waterproof immerse the fibre for about one hour in a bath of acetate of alumina 4° to 5° Baumé, prepared by dissolving hydrate of alumina in acetic acid after which it is squeezed and dried.

Patents for the Year 1911

PROCESS OF PRODUCING DYED-ACIDYLIZED-CELLULOSE COMPOUNDS.

Erich Friedemann, of Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 994,738, dated June 13, 1911.

Cellulose esters, such as for instance, acetyl cellulose, can only be dyed with difficulty, and the dyeing of these bodies according to the hitherto known methods suffers from the disadvantage that the strength of the cellulose esters is considerably reduced. The inventor has now found that dyed acidyl celluloses of great technical value can be obtained in a very simple manner by producing the acidyl derivatives from dyed cellulose compounds, such as cotton, wood-cellulose, oxy-cellulose, hydrocellulose, etc., with acidylizing agents. For the dyeing of the cellulose, coloring matters have to be used which are stable against the acid agents employed in the acidylizing process, *e.g.*, algol, indanthrene, or sulphur colors, etc. Algol red, helindone scarlet, rosanthrene, diazo brilliant scarlet can, for instance, be used for red, algol blue and indanthrene blue for blue, katigen brilliant-green for green, katigen violet or diazo indigo-blue for violet, katigen black or immedial black for black, etc. It is surprising that the shades are not deteriorated by the subsequent process of acidylation, but are even purer after acidylation than before. The possibility of using the above-mentioned dyestuffs is of great importance, as the shades produced with them are very fast to light. Dyed films and other articles of acetyl cellulose possessing an excellent fastness to light can thus be produced. The acidilyzing process is carried out according to the usual methods.

METHOD OF FORMING CLOTH WITH A SIMULATED METALLIC SURFACE.

Frank A. Price, of Elgin, Illinois. Patent No. 995,289, dated June 13, 1911.

The claims cover:

1. The method of forming a fabric consisting of preparing canvas (raw from the loom) so as to make it elastic and pliable and then applying a mixture of fine flour paste, white glue, and white bar soap; then drying the cloth; then coating it with pure linseed oil diluted with spirits of turpentine; then drying the cloth; then coating it with fat oil and nonpareil japan mixed together; then drying the cloth until it becomes "tacky"; and then rubbing on a mixture of aluminum and ultramarine blue.

2. The method of making gilded cloth which consists in making raw canvas elastic and pliable; applying a mixture of fine flour paste, white glue, and white bar soap; then drying; then coating with pure linseed oil diluted with spirits of turpentine; then drying; then coating it with fat oil and nonpareil japan mixed together; then drying; and then rubbing it with a mixture of aluminum and ultramarine blue.

PROCESS OF DYEING HALF-WOOLEN GOODS.

Max Becke and Albert Beil, of Höchst-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 995,431, dated June 20, 1911.

In further elaborating the invention described in U. S. Patent No. 815,671, the inventors have discovered a process of dyeing half-woolen spun goods and woven goods which offers considerable technical advantages over the methods hitherto used for dyeing half-woolen goods.

As is known, the two most important methods of dyeing half-woolen goods are, first, the older, so-called, "three-baths" method, which consists in dyeing the wool fibre with acid dyestuffs, subsequently mordanting the cotton fibre with tannic substances and metallic salts, and finally dyeing with basic dyestuffs; second, the "single-bath" method, according to which direct-dyeing dyestuffs are used. The older method has, as is known, the disadvantage of being intricate and giving dyeings

which easily wear off by rubbing, whereas the "single-bath" method has various disadvantages, namely, that it renders the goods flabby to the touch, that in many kinds of goods the wool-cover becomes uneven, and that the fact that the wool has a greater tendency to absorb the dye than the cotton renders it very difficult to obtain exactly the desired tints, which applies to one-colored (plain) dyeing as well as to contrast dyeings.

The above-mentioned drawbacks are remedied by the new process which consists in dyeing the wool fibre and impregnating it with tannic substances and a metallic salt, so that when the cotton fibre is subsequently dyed the capability of the wool fibre to absorb the dyestuff further is diminished or removed.

The procedure is as follows: The half-woolen fabrics or spun goods are first dyed the tint desired for the wool fibre with a dyestuff dyeing in the boiling acid bath, to which tannin or another tannic substance is added. To this dye bath tartar emetic or another metallic salt is then added and the tannic substance thus fixed. Thereupon the cotton fibre is dyed with a direct cotton dyestuff in a hot bath to which Glauber salt or common salt is added, in which operation it is possible to dye the cotton any desired tint without affecting in any way the dyeing of the wool fibre, which is not possible by the hitherto known processes; it follows that the new method can be applied both for dyeing half-woolen spun goods and woven goods, one-colored tints, and for producing any desired two-colored effects. The metallic salt to be used for fixing the tannin may also be added in a separate bath or in the dye bath in which the dyeing with cotton dyestuffs is carried out.

A particular method of carrying out the process consists in dyeing half-woolen goods which besides wool (or shoddy) and cotton fibres also contain previously dyed wool fibres treated according to the process described in U. S. Patent No. 815,671. In this case multi-colored effects are obtained in half-woolen goods.

PROCESS FOR STRENGTHENING CELLULOSE.

Xavier Eschalier, of Villeurbanne, France. Patent No. 995,-852, dated June 20, 1911.

This invention relates to a process of strengthening solid cellulose bodies, more particularly the depolymerized cellulose bodies in various stages of hydration, produced from solutions in the different solvents. The strengthening of the aforesaid bodies, according to this process, is in the nature of a polymerization or a condensation; its effect being very appreciable in the dry state and especially so in the wet state.

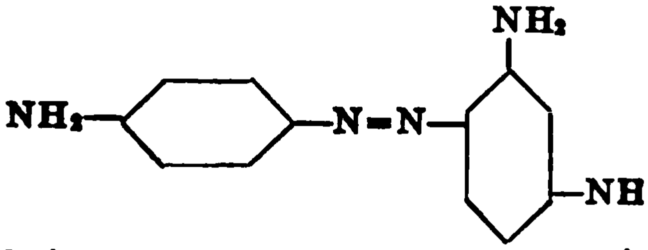
In the case of cellulose filaments the strengthening shows itself in an increased tenacity in the dry state and especially so in the wet state.

The process consists in the action on the above-mentioned bodies, under the hereinafter stated conditions, of aldehydes and aldehyde compounds or their products of polymerization, more especially of formaldehyde or its polymers; ordinary aldehyde compounds and non-polymerized aldehydes, however, have a more effective and more rapid action than their products of polymerization.

PROCESS OF DYEING.

Felix Binder, of Mülhausen, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 996,396, dated June 27, 1911.

This invention relates to the manufacture and production of shades fast to washing by oxidation of para-aminobenzene-azo-metaphenylenediamine of the following formula:



on fibres and fabrics.

In carrying out this invention the fibre is either impregnated with a solution of para-aminobenzene-azo-meta-phenylenediamine (which solution contains an oxidizing agent) and the goods are steamed after being dried, or the fibre is first impregnated with the said dye and then treated with oxidizing agents, or the oxidizing agents are deposited on the fibre and the latter is then treated with aminoazo compound.

METHOD OF DYEING YARN.

John C. Hebden, of Providence, Rhode Island, and Frederick H. Daniell, of Franklin, New Hampshire; Mary B. Daniell, of Franklin, New Hampshire, executrix of said Frederick H. Daniell, deceased. Patent No. 996,761, dated July 4, 1911.

This invention relates to the art of dyeing yarn in the cop or package, and consists of improvements in the method of preparing, arranging, and treating the cops in dyeing or similar processes, such as oxidizing, mordanting, bleaching, steaming, scouring, drying, washing, or the like.

The inventors have discovered a method of supporting the yarn in cops and arranging the cops under compression so that the yarn mass is of uniform density throughout, and presents a sufficiently large area on the inner surface to facilitate a thorough penetration. The liquor or gas is forced through the cop from the interior opening, and in some cases withdrawn again back through the yarn, by means of suction, or it might be forced through from the outside of the cop.

It is desirable to dye a large number of cops at one time; and in order to present an even resistance to the penetration of the liquor throughout all the cops the yarn is compressed into one solid mass. The packages are arranged end for end, with their central openings aligning, and pressed together into one continuous tubular mass with a central opening. For convenience in handling it is preferable to arrange the cops in units, with from three to six caps in each unit. A number of units

is then placed in the dyeing chamber, as many as it will accommodate, and all the cops subjected to the liquor at one time.

TREATMENT OF ANIMAL SUBSTANCES SUCH AS WOOL, SILK, OR HAIR.

Louis Meunier, of Lyon, France. Patent No. 998,370, dated July 18, 1911.

In the present invention is devised a simple and ready method for increasing the tensile strength and the chemical resistance of animal fibres and of the fabrics and threads made from or with such fibres, which embraces a treatment with the product of oxidation of the phenols, and more particularly with the oxidation products having a quinone structure, such as ordinary quinone. Experiment has shown that in treatment of such fibres with aqueous solutions of phenols, either neutral or acid, under exclusion of air or oxidizing influences, the fibres do not undergo any change useful for the present purposes; but if the treatment be conducted under oxidizing conditions the fibres are changed, taking on a coloration and becoming much more resistant to the action of water and chemicals. And if in lieu of treatment with phenols undergoing oxidation, the treatment be directly with pre-formed oxidation products, and particularly with products having a quinone structure, a much more rapid and advantageous change is effected. Direct oxidation of phenols of the hydroquinone type gives quinones.

TREATMENT OF MERCERIZED COTTON GOODS.

Friedrich Eduard Böttiger, of Offenbach-on-the-Main, Germany, assignor to the corporation of Chemische Fabrik Griesheim-Elektron. Patent No. 1,002,026, dated August 29, 1911.

According to the present invention a very good crackling feel or scroop can be imparted to cotton by means of hydroxycarboxylic acids of the aliphatic series, to wit: lactic or tartaric acid, by the addition of such proportions of the salts of the said

acids or by partly neutralizing the said acids to such a degree that the cotton fibre may not be tentered. How much of the acid has to be neutralized or how much lactate or tartrate has to be added to the acid bath depends on the intensity of the dyeing, on the sulphurized dyestuff used in the dyeing process, and on the proportion of acid added to the bath.

PROCESS OF DYEING FABRICS.

Adolph Rutler, of Sunbury, Pennsylvania, assignor to Susquehanna Silk Mills. Patent No. 1,005,888, dated October 17, 1911.

This invention relates to the process of dyeing fabrics of silk, cotton, or other material in large quantities; and the object of the invention is to provide a process of economically and uniformly dyeing such quantities of fabric in a short period of time.

For the accomplishment of the above object, the invention comprises the process of dyeing a fabric which consists in passing the fabric in a web, wetting the fabric with free-flowing jets of dyestuff supplied in excess of what the fabric will absorb, thus dyeing the same, the excess of dyestuff being permitted to run from the fabric into a bath with which it is permitted to mix so as to keep the bath of uniform strength and to be used again in wetting the fabric.

PROCESS OF DYEING.

Myrtil Kahn and Anton Ossenbeck, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,006,097, dated October 17, 1911.

The present invention relates to the production of fast-brown shades on the vegetable fibre which are obtained by padding the fibre with acid chrysoidines, such as the sulphonic and carboxylic acids of chrysoidine, especially chrysoidine monosulphonic or

monocarboxylic acids and then treating it with diazotized nitranilines. Bright brown shades are thus obtained which are very fast to washing and can be readily discharged.

The claims specifically cover the process using para-sulphanilic acid-azo-meta-phenylenediamine.

PROCESS OF SCOURING OR CLEANING WOOL.

William J. Croston, of Lawrence, Massachusetts, assignor of sixty one-hundredths to William H. Dwelly. Patent No. 1,006,-726, dated October 24, 1911.

The present invention has for its object to remove the materials used for marking, so that the waste wool may be freed and cleansed from the same and what is now a waste material may be converted into a highly useful product. For this purpose, the marked wool is subjected to the action of a solution containing ingredients which will effectively free the wool from the materials used to mark the same, and excellent results are obtained with a solution composed of benzine, alcohol, and bisulphide of carbon, preferably in the following proportions, to wit: 7 parts benzine, 86 proof, 5 parts methyl alcohol, and 3 parts bisulphide of carbon. The marked wool or paint clips are put into this solution and subjected to heat, which may be imparted by a water bath brought to boiling point.

To render the action of the solvent effective in the least possible time, the wool while saturated with the solvent is subjected to pressure so as to disintegrate or crush the marking material and open it up, as it were, so that the solvent can readily reach the wool and thereby effect the separation of the marking material from the wool without dissolving the entire mass of the marking material. This separation of the marking material from the wool when subjected to pressure usually takes but a few minutes, and may be effected by the operator kneading or pressing the wool in the bath by hand, after which the wool is agitated or shaken to separate mechanically the undissolved

marking material from the wool. This shaking may be effected in the bath of solvent, after which the wool thus freed from the marking material is removed from the solvent and subsequently washed with soap and water in any suitable or desired manner and as now commonly practised in scouring wool.

PROCESS OF CONDITIONING TEXTILE MATERIAL.

Isaac E. Palmer, of Middletown, Connecticut. Patent No. 1,008,613, dated November 14, 1911.

This invention relates to processes for conditioning textile material in narrow band-like condition, and more particularly relates to the treatment of warp for subsequent use as warp or filling.

By this process the textile material which is preferably chain warp is twisted while in a chain or band upon itself or axially of the mass and in this condition is passed through the treating liquor. The chain warp may be of the usual or any suitable length. It is evident that the textile material may be twisted by the apparatus from which it is delivered into the vat or receptacles containing the treating liquor, substantially as described in U. S. Patent No. 1,001,435, or it may be twisted independently of such apparatus or mechanism, or the warp may be twisted during and as a part of the warping process. It may be twisted either mechanically or manually. The material is preferably uniformly twisted, but only sufficiently to keep the threads collected, as, for example, a single twist to a yarn. Any suitable number of warp ends may be united into the mass that is twisted and treated, as, for example, a very few or five hundred or more. By twisting the warp as described the ends are kept from straggling or becoming misplaced. Preferably the warp thus twisted and subjected to a treating liquor, such as a dyeing liquor, is used for warp threads. After the warp or other textile material has been passed through the treating liquor, it is untwisted in any suitable manner.

PROCESS FOR TREATMENT OF WOOL.

Emil Elsässer, of Langerfeld, Germany. Patent No. 1,008,-249, dated November 14, 1911.

The object of this invention is to beautify or improve wool and the like, especially by increasing its gloss without affecting its solidity. To this end the wool is heated with so strong a bisulphite solution that the wool shrinks and assumes a rubber-like condition in which it may be extended to almost double length according to the kind of wool, and fixed in this stretched condition. The product obtained in this way displays a considerably higher gloss and a greater affinity for dyestuffs than the untreated material, while the strength of the stretched material is greater than that of the unstretched and sometimes also than that of the untreated material. The concentration of the bisulphite solution necessary for producing this result cannot be limited in degrees, because it depends upon the temperature, the duration of the treatment, and the kind of the wool. In each case, the solution should be so strong that the wool tends to shrink and assumes a rubber-like condition. Instead of stretching the material after shrinkage during the treatment or immediately thereafter, the material can also be kept stretched to prevent shrinkage. The fixing of the stretched wool fibre may be effected in various ways, for example, by prolonged boiling in water preferably with the addition of a smaller percentage of sulphuric acid, or by the action of baths, containing substances which decompose or combine with the bisulphite, such as chlorine, metallic salts like alumina salts, basic bodies, formaldehyde and the like, or by damping or steaming or by drying and decomposition of the bisulphite by means of gaseous substances with subsequent damping and steaming, or by cooling or cold washing. Instead of bisulphite solutions there may be employed double compounds of bisulphite, which split up at higher temperatures, such as acetone bisulphite.

The wool can be used in any desired form, that is, as loose

wool, yarn, fabric, and the like. Other substances, such as hair, feathers, and in sufficiently thin form even horn, fish bones, and the like, behave similarly to wool in presence of bisulphite.

PROCESS OF DYEING WITH BENZOQUINONE DERIVATIVES.

Rudolf Lesser, of Berlin, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,009,981, dated November 28, 1911.

This invention relates to a process of dyeing in the vat with certain benzoquinone derivatives. Some of these products are already known, but their dyeing properties have not been ascertained. The dyestuffs which were found to be suitable for vat dyeing are derived from benzcquinone; they are quinonediarylides which are produced in known manner by heating aromatic amines with benzoquinone, its homologues, or halogen derivatives, in an indifferent solvent, such as alcohol, glacial acetic acid, or nitrobenzene, with or without addition of a neutralizing agent or catalytic agent.

The constitution of the new products is as follows:

$$C_6O_2\begin{cases}(NHaryl)_2\\X_2\end{cases}$$

wherein X means hydrogen, an alkyl, or a halogen.

The dyeing process consists in reducing the quinonediarylides in an alkaline solution, then dyeing or printing the fibre with the leuco compound thus produced and developing the color by exposure to the air or by an oxydizing agent.

PROCESS OF PRODUCING DISCHARGEABLE DYEINGS ON COTTON.

Otto Ernst and Heinrich Eichwede, of Höchst-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 1,012,619, dated December 26, 1911.

It is known that by impregnating the fibre with chrysoidine hydrochloride and then developing and fixing the chrysoidine by a subsequent treatment with nitrodiazobenzene, there can be obtained dyeings on cotton which are capable of being discharged. Now, according to the present invention, such dyeings can be produced very advantageously by using monoazo dyestuffs obtainable by combining a diazotized amino-naphtholsulphonic acid with meta-phenylenediamine or a derivative thereof. The azo dyestuffs most suitable for this process are those obtained from aminonaphtholsulphonic acids which, after being diazotized, are still capable of being combined with one molecular proportion of nitrodiazobenzene. These "developing" dyestuffs are therefore distinguished from the chrysoidines hitherto used, not only by the fact that they are sulphonic acids and that they are applied to the fibre in the form of the salts of these acids, but also by the fact that they can be combined with two molecular proportions of nitrodiazobenzene. This is the essential difference and owing to this property the dyestuffs are transformed on the fibre into products of greatly increased molecular weight, especially as they receive two molecules of the nitrodiazobenzene, thus rendering the dyeings very intense and very fast to washing, a result which could not be expected owing to the presence of the sulphonic acid groups. The dyestuffs containing sulphonic acid groups which have been hitherto developed in a similar manner are direct dis- and poly-azo-dyestuffs and are already, as such, of rather good fastness to washing. In the present process the good solubility of the dyestuffs in water is of great importance; it facilitates their application to the fibre and renders the use of boiling baths unnecessary.

The tints obtained by the new process vary from reddish-brown to violet-brown and are also sometimes blackish, according to the dyestuffs used. The monoazo body obtained from a diazotized 1: 5-, 2: 8-, or 2: 5-aminonaphtholsulphonic acid yields pronounced brown tints of a reddish to violet hue, while the dyestuffs obtained from a 1: 8-amino-naphtholsulphonic acid yields blackish-brown tints.

III.—CHEMICAL PROCESSES.

METHOD OF MAKING LEAD CHLORIDE.

Edwin O. Barstow, of Midland, Michigan, assignor to the Dow Chemical Company. Patent No. 984,525, dated February 21, 1911.

The present invention describes a method of making lead chloride ($PbCl_2$), which comprises a process for making such chloride directly from metallic lead and commercial chlorine.

PRODUCING ACETYLENE TETRACHLORIDE.

Erich Hoefer and Martin Mugdan, of Nuremberg, Germany. Patent No. 985,528, dated February 28, 1911.

The inventors have found, however, that under suitable conditions acetylene tetrachloride may also be obtained, if ferric chloride alone is used to effect the reaction between the chlorine and acetylene, the presence of sulphur chloride or other active supplemental chlorinating agent being unnecessary. If chlorine and acetylene are fed into heated acetylene tetrachloride mixed with anhydrous ferric chloride, the whole being stirred the while, these gases, if introduced into the mixture in proper proportions, will be united approximately quantitatively forming acetylene tetrachloride. The acetylene tetrachloride may be easily separated out by distillation in a current of steam or by any other suitable means and will be obtained in a good quality.

The ferric chloride employed in the present process acts as a reaction-facilitating agent or true catalyzer.

METHOD OF PRODUCING AMMONIUM PERCHLORATE.

Oscar Birger Carlson, of Månsbo, Avesta, Sweden, assignor to Oscar Fredrik Carlson. Patent No. 985,724, dated February 28, 1911.

The claim covers the method of producing ammonium perchlorate which consists in reacting upon sodium perchlorate with ammonium sulphate and crystallizing out the ammonium perchlorate while the temperature is not lower than 22° C.

PROCESS FOR THE MANUFACTURE OF SOLUBLE SOLVENTS.

George Nauton, Henri Nauton, and Gustave De Marsac, of St.-Ouen, Seine, and Théodore François Tesse, of Paris, France. Patent No. 983,751, dated February 7, 1911.

The claims cover:

1. The process for the manufacture of limpid solvents completely soluble in water, which consists in sulphonating in the cold castor oil, by conducting the sulphonation so that the sulphonated oil may be capable of absorbing 12 to 12.5 per cent. of potash, in mixing the sulphonated oil with a quantity of 10.5 to 11.5 per cent. of alkali, in adding a chlorinated hydrocarbon derived from ethylene, and in diluting with water so that the proportions of chlorinated hydrocarbon shall not exceed 20 per cent. of the final product.

2. The process for the manufacture of limpid solvents completely soluble in water, which consists in sulphonating in the cold castor oil, by conducting the sulphonation so that the sulphonated oil may be capable of absorbing 12 to 12.5 per cent. of potash, in heating to 50° C., in adding a quantity of 10.5 to 11.5 per cent. of alkali, in heating to a temperature not exceeding 100° C., then cooling to 70° C., and adding a chlorinated hydrocarbon derived from ethylene, and in diluting with water so that the proportions of chlorinated hydrocarbon shall not exceed 20 per cent. of the final product.

DEHYDRATION OF CAUSTIC ALKALI.

Paul Erwin Oberreit, of Ludwigshaften-on-the-Rhine, and Friedrich Moritz Jahrmarkt, of Mannheim, Germany, assignors to Badische Anilin & Soda Fabrik. Patent No. 983,834, dated February 7, 1911.

The claims cover:

1. The process of obtaining caustic alkali from solutions thereof which consists in concentrating the caustic alkali solution until it has reached the point at which it would act upon the material of the containing vessel, and then further concentrating *in vacuo* at a temperature sufficiently low to prevent action of the material of the vacuum drier but sufficiently high to drive off subsantially all of the water.

2. The process of obtaining caustic alkali from solutions thereof which consists in concentrating the caustic alkali solution until it has reached the point at which it would act upon the material of the containing vessel and then further concentrating *in vacuo* at a temperature of about 180° to 260° C.

DEHYDRATING HYDRATED HYDROSULPHITES.

Hermann Rey, of Basel, Switzerland, assignor to the firm of Society of Chemical Industry in Basel. Patent No. 987,170, dated March 21, 1911.

According to the present invention, a sodium alcoholate, made by dissolving sodium in methyl alcohol or ethyl alcohol, may be used as a very suitable dehydrating agent for hydrosulphites containing water or crystallization. The reaction proceeds spontaneously without any external application of heat, so that the dehydration can be completed in a very short time. This is an important technical effect as compared with all the processes hitherto known, since in the case of substances so easily decomposed as hydrosulphites, the most rapid possible working is a primary condition of success.

MANUFACTURE OF FATTY ACIDS.

Giacomo Bottaro, of Genoa, Italy. Patent No. 987,426, dated March 21, 1911.

This invention relates to a process of manufacturing fatty acids, based upon the employment of lime soaps as raw material, and the object thereof is to obtain fatty acids lighter than the neutral ones.

When recovering glycerine from neutral fats, the same is separated either by boiling in closed vessels or by the fermentative process or by the use of Twitchell's reactive into fatty acids and glycerine. Fatty acids of equal quality and color as those of the neutral fats employed for use in the manufacture of soap have never been obtained, but by the process in accordance with this invention, on the contrary, fatty acids lighter than the neutral ones are obtained, which increases their value of at least 10 per cent., because it is commonly known that a light soap has a greater value than a dark one. Therefore, with the process according to this invention, it overcomes the necessity of artificially whitening the soap by expensive methods, *i.e.*, the employment of closed receptacles for boiling, or by coloring through Twitchell's reactive or by the proteic substances used in the fermentative process. These methods on account of the great modifications of the fats produced by the high temperature, *i.e.*, of about 200° C., result very rarely in obtaining the object sought.

According to this invention, lime soap is decomposed into fatty acid and sulphite of lime, by means of a hot current of sulphurous anhydride (sulphur dioxide), thereby recovering the glycerine contained in the lime soap in a concentrated solution. To the current of sulphurous anhydride may be added a current of steam. If the current of sulphurous anhydride and water steam should be mixed with air, the by-product obtained would be sulphate of lime instead of sulphite of lime.

PROCESS OF MAKING ACETYL CELLULOSE COMPOUNDS.

Otto Bonhoeffer, of Elberfeld, and Hugo Guntrum, of Vohwinkel, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 987,692, dated March 28, 1911.

This invention relates to the manufacture and production of acetyl derivatives of cellulose which are distinguished by their solubility in acetone.

The process for their production consists in treating cellulose or parent materials, such as hydrocellulose, oxycellulose, etc., with acetylizing agents, such as acetic acid anhydride, acetyl chloride, etc., with the addition of acid sulphates (primary sulphates) of primary aromatic amines, such as aniline bisulphate, etc.

They are whitish granular powders soluble in acetone, a mixture of acetic ester with alcohol (4: 1), a mixture of chloroform with alcohol, and a mixture of nitrobenzene with alcohol.

The claims specify the use of ortho-toluidine-bisulphate.

PROCESS FOR THE MANUFACTURE OF CAMPHOR.

Jacob Schmitz and Gerhard Stalmann, of Dusseldorf, Germany, assignors to the firm of Dr. Schmitz U. Co. G. M. B. H. Patent No. 989,651, dated April 18, 1911.

The present invention refers to a process for manufacturing camphor from isoborneol or substances suitable for conversion into isoborneol, as borneol, esters of borneol, and esters of isoborneol.

The new process consists in heating the said substances to a temperature above 100° C. in a medium of alkaline reaction with oxidizing substances. As oxidizing substances, for instance, may be used peroxide of manganese, manganites, peroxide of lead, plumbates, permanganates, the oxides of copper, nickel, mercury, etc. If the oxidizing substance or the product formed from it by the reduction process is sufficiently basic to prevent a formation of camphene, which is easily formed from isoborneol, an addition of bases is not required. It is, however, generally preferable to add bases, even if without that addition the formation of camphene may be avoided, as is the case when using oxide of copper or oxide of nickel as the oxidizing substance. If peroxide of manganese is used as the oxidizing substance the addition of bases, as, for instance, oxide of calcium, hydroxide of calcium, is necessary.

PREPARATION OF ALUMINOUS COMPOSITIONS.

Edwin Taylor, of Brooklyn, New York, assignor to Union Clay Products Company. Patent No. 989,662, dated April 18, 1911.

The inventor claims:

1. The improvement in the preparation of aluminous compositions, the same consisting in adding partially vulcanized oil to clay having a content of sulphur, and then heating the mixture to complete the vulcanization of the oil.

2. The improvement in the preparation of aluminous compositions consisting in adding partially vulcanized oil to clay having a natural content of sulphur available for vulcanization, and then heating the mixture to complete the vulcanization of the oil.

3. In the preparation of aluminous compositions, first adding sulphur to a body of clay and intimately mixing the same, adding sulphur to oil and partially vulcanizing the latter, and then intimately mixing the clay and oil and thereafter heating the mixture to complete the vulcanization of the oil.

PROCESS OF PRODUCING AMMONIA.

Carl Bosch, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 990,191, dated April 18, 1911.

The invention relates to the production of ammonia from the so-called titanium cyanonitride, which can be made to yield ammonia in a manner which allows the reaction to be carried out on a commercial scale by oxidizing it under such conditions that none, or practically none, of the ammonia formed becomes further oxidized to free nitrogen. Provided that this condition be maintained, many different oxidation agents and methods may be employed, for instance, the reaction can be carried out in alkaline, or neutral, or acid solution, or suspension, or even in a melt. In all cases of course some body containing hydrogen

such, for instance, as water, or steam, or sulphuric acid, must be present. As oxidizing agents, chromic acid, manganese dioxide, iron dioxide, copper oxide, cerium oxide, mercury oxide, and salts corresponding to these oxides may be used. The oxidation may also be caused to take place by treating the titanium cyanonitride with steam in the presence of an oxide or hydroxide or salt of an alkali or alkaline earth metal (such, for instance, as sodium carbonate, caustic soda, and calcium chloride) which, by itself, under the conditions used as to temperature and quantity, has no oxidizing action, or practically no oxidizing action, on the titanium compound, but which in the presence of steam favors the oxidation. Steam by itself does not react upon titanium cyanonitride until such a temperature is reached that the ammonia formed is decomposed again to a greater or lesser extent. Or the oxidation may be carried out by heating the titanium cyanonitride with a bisulphate, provided the temperature employed be not too high, and by boiling it with concentrated sulphuric acid. If desired, the treatment with sulphuric acid or with a bisulphate can be caused to take place in the presence of water and under pressure. Electrolysis with or without the use of so-called oxygen carriers can also be employed to effect the oxidation, and even air can be used in the presence of steam or water (if necessary under pressure, and using an oxygen carrier) to bring about oxidation.

PRODUCING AMMONIUM SALTS.

Carl Bosch, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 990,192, dated April 18, 1911.

In the specifications of other applications is described the production of ammonia by treating titanium cyanonitride and the titanium nitrides with an oxidizing agent. The inventor now claims that the titanium nitrides can be made to yield ammonia by heating them with an acid, under which term is included a salt which splits off acid, while maintaining the temperature so

low that no oxidation of the titanium compound takes place. The reaction may be carried out in the presence of water or steam. If concentrated sulphuric acid be employed according to the present invention, the temperature used may not exceed about 170° C., as otherwise the sulphuric acid acts as an oxidizing agent. When other acids are employed, the temperature used may be higher, but in each case, as aforesaid, it must be below that temperature at which the acid being used is able to exert an oxidizing influence on the titanium compound. The titanium compound is obtained in the form of a salt of one of the lower oxides of titanium and can easily be reconverted into tianium nitride or titanium cyanonitride.

PROCESS OF MANUFACTURING NITRITES AND NITRATES.

Harry Pauling, of Gelsenkirchen, Germany, assignor to Salpetersäure Industrie-Gesellschaft, G. M. B. H. Patent No. 991,-356, dated May 2, 1911.

This invention relates to processes of recovering nitrates and nitrites; and it comprises a method wherein nitrous vapors, such as those produced in the oxidation of atmospheric nitrogen, are methodically treated and absorbed in such manner as to give relatively pure nitrites and nitrates, such vapors being first exposed to a solution relatively rich in nitrates and subsequently to solutions suited to form nitrites, such solutions being finally treated to recover nitrites and form a mother liquor rich in nitrates, such mother liquor being utilized for the first treatment of the nitrous gases.

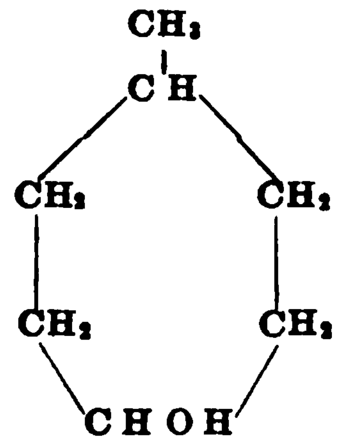
PROCESS OF PRODUCING BETA-METHYLADIPIC ACID.

Fritz Hofmann and Carl Coutelle, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 991,719, dated May 9, 1911.

This invention relates to a new and valuable process for

producing beta-methyladipic acid which is a valuable intermediate compound for producing other products of technical importance.

The new process consists in treating para-methylcyclohexanol:



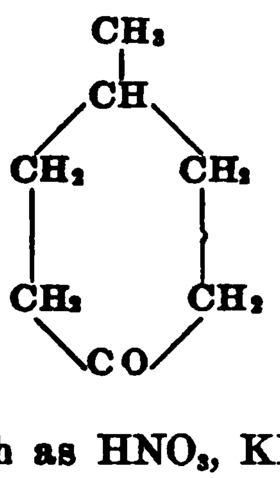
with oxidizing agents, such as HNO_3, $KMnO_4$, $K_2Cr_2O_7$.

PROCESS OF PRODUCING BETA-METHYLADIPIC ACID.

Fritz Hofmann and Carl Coutelle, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 991,720, dated May 9, 1911.

This invention relates to a new and valuable process for producing beta-methyladipic acid which is a valuable intermediate compound for producing other products of technical importance.

The new process consists in treating para-methylcyclohexanon:



with oxidizing agents, such as HNO_3, $KMnO_4$, $K_2Cr_2O_7$, etc.

PROCESS OF PRODUCING BETA-METHYLTETRAMETHYLENE-DIAMINE.

Fritz Hofmann and Carl Coutelle, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 991,721, dated May 9, 1911.

This invention relates to a new and valuable process for producing beta-methyltetramethylene-diamine.

$$NH_2-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_2-NH_2$$

which is a valuable intermediate compound for the production of pharmaceutical compounds, dyestuffs, etc.

The new process consists in treating the diamide of beta-methyladipic acid:

$$NH_2-CO-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_2-CONH_2$$

with aqueous solutions of halogens in caustic alkaline lyes.

PROCESS FOR OBTAINING ALCOHOLS OR ALCOHOLIC MATTERS FROM WOOL FAT.

Severin Morgenstern, of Charlottenburg, Germany. Patent No. 991,874, dated May 9, 1911.

Heretofore attempts have been made analytically to isolate the wool-fat alcohols by precipitation methods as well as by synthetic methods, for instance, acetylization or benzoylization; but such methods cannot, of course, come into question for commercial purposes because of the cost. No purification by distillation on a commercial scale of the alcohols has heretofore been carried out, because the saponification product of the wool fat has always been treated first. In fact, saponified wool-fat mixtures, wherein also part of the alcohols has been freed, could not in the form heretofore known be distilled, at least not in the sense that commercially useful products were obtained, but there were obtained strongly colored and strongly smelling

distillates which had been rendered very impure by products of decomposition. Now the applicant has found that this phenomenon depends upon the fact that in previous saponifications too much neutral fat has been left undecomposed, and therefore the raw alcohol mixtures were produced with a great amount of neutral fat. Such mixtures yield in the lower fractions very impure distillates, and the higher fractions do not approach chemical purity, but are so altered by greasy and tarry products as not to possess their characteristics. The applicant has, furthermore, found that if distillation commences with a raw product, wherein the neutral fats have been decomposed as much as possible, undecomposed products can be obtained even up to the highest fractions. If a raw alcohol mixture contains say not more than 2 to 3 per cent. of neutral (*i.e.*, unsaponified) constituent parts, it is possible to obtain distillates of almost chemical purity up to and including the last fractions, and when the distillation is carried on with care the mixture can be fractionated in a vacuum in an excellent manner.

PROCESS FOR THE PURIFICATION OF ALCOHOL AND SIMILAR LIQUIDS.

Emile Guillaume, of Blida, Algeria. Patent No. 992,498, dated May 16, 1911.

This invention relates to a new and improved process for the purification of alcohol and similar liquids.

It relates particularly to a continuous process for removing in one operation and in one combined apparatus the impurities mixed with the alcohol under the name of "head" and "tail" products, whereby there is obtained, as the final product, a pure alcohol of very high degree, 99 per cent., the other 1 per cent. being water and slight traces of other impurities.

It relates, further, to a process in which there are obtained in one operation two grades of alcohol, the one having a high quality suitable for many technical purposes, and the other, an alcohol of the highest attainable purity. The first grade amounting, for example, to about one-half the total quantity obtained,

is drawn off from one of the upper shelves of the rectifying column in the form of ethyl alcohol practically free from head products, but containing a small quantity of the most volatile tail products. The second portion passing from the top of the dephlegmator, or condenser, into the purifying apparatus, consists of ethyl alcohol carrying head products. It is from this second portion that the ethyl alcohol, free from head products, is obtained almost absolutely pure.

PROCESS FOR THE MANUFACTURE OF FORMATES.

Arnold Wiens, of Bitterfeld, Germany. Patent No. 993,331, dated May 23, 1911.

In the manufacture of formates from caustic alkalies and carbon monoxide, it has hitherto been considered necessary that the caustic alkali should be used in a finely divided condition. In some instances, the caustic alkali is, before use, finely powdered and eventually mixed with diffusing media such as lime or coal, while in other instances, it is used in the form of solutions which, by means of stirring devices, are brought into intimate contact with the current of carbon monoxide. The inventor has discovered, however, that there is no necessity for reducing the caustic alkali to a finely divided condition before use, and that the theoretical yield can still be obtained, even when the alkali is used in large pieces (for instance, of a size varying between that of a pea and that of the fist) and without admixture of the alkali with such substances as lime or coal, if suitable mechanical means for stirring the material is provided.

PROCESS OF MAKING NITROGENOUS COMPOUNDS.

Georg Erlwein and Karl Warth, of Berlin, Germany, assignors to Siemens & Halske A. G. Patent No. 994,095, dated May 30, 1911.

The subject-matter of this invention is a process of manufacturing nitrogen products which when treated with water at

a high temperature yield ammonia. According to the process the said nitrogen products are made by a carbide, *e.g.*, calcium carbide, being changed in a manner known *per se* by heating it to a temperature between about 300° and 1000° C. so that when it is treated with water no hydrocarbon at all or only very small quantities thereof are generated. The product thus obtained is treated with nitrogen at a high temperature.

MANUFACTURE OF SODIUM BICHROMATE.

Thomas John Ireland Craig, of Manchester, England, assignor to Peter Spence & Sons Limited, of Manchester, England. Patent No. 994,129, dated June 6, 1911.

In the manufacture of sodium bichromate as described in the specification to U. S. Patent No. 725,501, a part of the process consists in driving off by boiling in a suitable closed vessel, the ammonia from a solution containing ammonium chromate and sodium chromate, such solution being at the same time concentrated by the boiling.

It has since been ascertained in practice that the elimination of ammonia from the solution is assisted by passing into the liquor, before its concentration or boiling in the closed vessel described, a current of steam. This method of treating the liquor, however, although efficient, necessitates considerable consumption of fuel to raise the necessary steam.

In carrying the present invention into effect for the removal of ammonia from a solution containing ammonium chromate and sodium chromate, concentrate the solution to a high degree by boiling, for example, to a specific gravity of about 1.85 at its boiling point, *i.e.*, approximately 120 degrees Centigrade, and then pass into it in a suitable vessel, for example, a still, steam at a temperature well above the boiling point of the liquor at about this degree of concentration. It may be obtained by generation under the necessary pressure to give the required temperature or by superheating. The remaining ammonia contained in the concentrated solution is readily removed as far as is desirable by this treatment.

PROCESS OF MAKING AMMONIUM SULPHATE AND SULPHITE.

Franz Wolf, of Bochum, Germany. Patent No. 994,435, dated June 6, 1911.

The inventor claims a process of obtaining ammonium sulphate and sulphite from the gases of dry distillation of fuel, which consists in separating the tar from said gases, washing the gases freed from tar to obtain an ammoniacal liquor, burning the gases freed from tar and ammonia to transform the sulphur contained therein into sulphur trioxide and sulphur dioxide, and treating the gaseous products of combustion with said ammoniacal liquor to form ammonium sulphate and sulphite.

PROCESS OF PREPARING CAMPHOR.

Ossian Aschan, of Helsingfors, Russia, and Wilhelm Kempe, of Berlin, Germany, assignors to Chemische Fabrik auf Actien (vorm. E. Schering). Patent No. 994,437, dated June 6, 1911.

According to this invention camphor is obtained by heating a borneol, which may be borneol or isoborneol in the liquid state, with or without a solvent, in the presence of a metal having the property of splitting off hydrogen from borneol, such as nickel, cobalt, copper, etc., nickel and cobalt being particularly desirable and effective.

The action of the metal is catalytic. In heating the borneol with the metal the latter takes up hydrogen from the borneol, thereby producing camphor and a combination of the metal and hydrogen, which combination decomposes readily into its constituents. The hydrogen escapes and the metal acts further upon unchanged borneol in the same manner. The following equations, in which Me indicates a catalytic metal, illustrate the reaction:

$$C_{10}H_{18}O + Me = C_{10}H_{16}O + MeH_2$$
$$MeH_2 = Me + H_2 \quad (Me = metal)$$

The effect of the metal consists in taking up hydrogen from the borneol and then releasing the hydrogen. The resulting camphor is recovered by distillation, while the metal remains as a residue and can be used again.

If an oxide is used, for instance cupric acid, it should be used in quantity which is insufficient to oxidize the borneol. The oxide is reduced to metal and the latter acts as described.

Any solvent may be used which dissolves the borneols at the temperature at which the process is carried on and which does not chemically influence the borneols or the metal.

PROCESS FOR THE MANUFACTURE OF ALCOHOL.

Aquiles Ernesto V. Castro, of Merida, Mexico. Patent No. 996,400, dated June 27, 1911.

The invention relates particularly to processes for the manufacture of alcohol from the juice obtained from sisal hemp leaves and from similar plants known as *Agaves*. Heretofore the fermentation and extraction of alcohol from the juice of these plants has required a slow fermentation extending over several days, and the object of my invention is to produce a quick and rapid fermentation, as quick as from four to six hours, whereby the output of a plant of a given size may be materially increased, the amount of labor reduced, and the cost of production cheapened.

According to this process the fresh and cold juice obtained from the above-mentioned plants is mixed with a certain amount of scraped or pulverized raw potatoes, coarse brown sugar, ground Indian corn, and the down of a plant called *pinuela*, and the mixture allowed to ferment. These proportions give good results: 144 litres of sisal hemp juice or juice of the similar *Agaves;* 8 ounces of scraped raw potatoes; 8 ounces of coarse brown sugar; 8 ounces of ground Indian corn; and ½ ounce of the down of *pinuela* plant. These ingredients are mixed and the mixture allowed to ferment in any suitable vessel, during four to six hours. After the fermentation has taken place, which

happens in a much shorter time than with any of the old methods of fermentation, the mixture may be distilled and purified in any well-known apparatus.

PROCESS OF OBTAINING NITROGEN.

Charles E. Acker, of Ossining, New York, assignor to the Nitrogen Company, a corporation of New York. Patent No. 999,003, dated July 25, 1911.

This invention relates to the production of nitrogen from atmospheric air and specifically to processes for removing oxygen from air in such manner as to leave the residual nitrogen in condition for use in the manufacture of nitrogen compounds, particularly cyanides, which require nitrogen.

The method consists in bringing air previously deprived of all moisture and carbon dioxide into contact with molten sodium or potassium cyanide, or a mixture thereof, at a temperature of 500° C. or over, whereupon the oxygen of the air will react with a portion of the cyanide, *e.g.*, sodium cyanide ($NaCN$) to form sodium cyanate ($NaCNO$) which, being perfectly miscible with the cyanide, will diffuse throughout the molten mass, while the nitrogen content of the air will remain unaffected and may be collected in the pure state. The cyanate is also of substantially the same density as the cyanide.

REDUCING INDIGO COLORING MATTERS.

Paul Erwin Oberreit, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 999,055, dated July 25, 1911.

The specification of U. S. Patent No. 820,900 describes the reduction of indigo and similar coloring matters by treating them with iron powder in the presence of a caustic alkali solution containing at least 6.5 per cent. of solid caustic alkali, and that U. S. Patent No. 843,566 describes a modification of the aforesaid process in which a part, or the whole, of the alkali is replaced, for instance, by alkali carbonate.

The inventor has found that the reduction of indigo coloring matters, which includes indigo itself and its homologues and halogen derivatives and also indigo-red and thioindigo and derivatives of these compounds, can be carried out by means of ferrous oxide and alkali, and that the reaction proceeds almost quantitatively. This result was not to be anticipated, because, when ferrous hydrate is employed in the production of indigo vats, a considerable portion of the indigo is destroyed (see Beilstein, Vol. 2, page 1623). The reduction is preferably carried out in the presence of caustic alkali of a concentration similar to that given in the specification of U. S. Patent No. 820,990, although alkali carbonate can be used instead of caustic alkali. Instead of pure ferrous oxide, a mixture thereof with iron powder can be employed, and, if desired, the ferrous oxide, or the mixture thereof with iron powder, can be treated with acid and then washed before being used for reducing purposes. This treatment with acid is, for instance, useful when the ferrous oxide, or the mixture of ferrous oxide and iron powder, has been exposed to the air for any considerable time.

PROCESS OF MAKING STABLE CALCIUM PERBORATE.

Reinhold Grüter, of Charlottenburg, Germany, assignor to Chemische Werke vorm. Dr. Heinrich Byk. Patent No. 999,497, dated August 1, 1911.

The inventor claims that calcium perborate can be prepared in a practical way, avoiding the previously described drawbacks, if the calcium perborate is protected as far as possible from hydrolysis on its formation. This result is attained by working in the presence of little water or with such other diluents which are known to have a restraining effect upon hydrolysis. When, for example, a calcium salt is dissolved in very little water, the solution warmed, and solid crystallized sodium perborate added to the concentrated solution, the known reaction at once occurs. A precipitate of calcium perborate is

at once formed and sodium chloride is produced. The calcium perborate is formed in clots or lumps and may with advantage be ground up again with the whole reaction mass in order that inclosed particles may be subjected to the reaction. The perborate may also be added mixed with water.

When the quantity of water used is sufficient for permitting the sodium chloride formed to go into solution, the calcium perborate is drained by suction and so thereby freed from the sodium chloride solution. It is possible, however, to work with less water, and even to limit this to the water of crystallization. In this case, after completion of the reaction and cooling, sufficient water has to be added to bring all the sodium chloride into solution; the precipitate is then drained by suction and washed with water. With this method of working, the conversion may with advantage be carried out in ball mills.

When the calcium perborate is actually formed, it is much less sensitive to water and it can, therefore, be mixed with an ample quantity of water for dissolving out the sodium chloride. It appears, therefore, that it is only during the actual formation of the calcium perborate that the water exerts an essentially hydrolytic action.

PROCESS FOR THE MANUFACTURE OF WHITE LEAD.

Leopold Falk, of Reval, Russia. Patent No. 999,637, dated August 1, 1911.

The basic claim covers the process for the preparation of white lead consisting in leading carbonic acid or gases containing carbonic acid under pressure into a solution of basic lead acetate until neutral lead carbonate has formed, and then stirring the neutral lead corbonate thus obtained in the cold in the presence of a small quantity of lead acetate with such a quantity of litharge that a white lead of the formula

$$5PbCO_3 2Pb(OH)_2 PbO$$

is obtained.

Patents for the Year 1911

PROCESS FOR THE MANUFACTURE OF OXALIC ACID AND OTHER OXYGENATED CARBON PRODUCTS.

Auguste Deiss, of Marseilles, France. Patent No. 999,551, dated August 1, 1911.

This invention consists of a process for the manufacture of oxalic acid and other oxygenated carbon products from the waste of wood paper-pulp and like pulps derived from other fibrous materials, also from the waste of plants, and from the plants themselves, by the simultaneous action of superheated steam under pressure and of more or less concentrated alkalis.

Broadly speaking, the process consists in subjecting simultaneously the vegetable material to the oxidizing action of air-free superheated steam operating under pressure, and to the action of more or less concentrated caustic alkalis, likewise heated.

MANUFACTURE OF OXALATES.

Carleton Ellis, of Larchmont, New York, assignor to Ligno-Chemical Company. Patent No. 1,001,937, dated August 29, 1911.

This invention relates to improvements in the manufacture of oxalates and comprises a continuous process of making oxalates which includes the production of a travelling stream of oxalate-forming material and the treatment of such stream under varied thermal and other conditions at different points along its line of travel to produce oxalates; all as more fully hereinafter set forth and as claimed.

PROCESS OF MAKING ACETATES.

Harry O. Chute, of Cleveland, Ohio, and Karl P. McElroy, of Washington, District of Columbia, assignors to Ligno-Chemical Company. Patent No. 1,002,034, dated August 29, 1911.

This invention relates to processes of making acetates and consists in a method of preparing acetates from the products of

the digestion of woody fibres with alkali by systematically and methodically heating such products under regulated conditions, and in recovering both the acetate formed and the excess of alkaline reagent.

PROCESS OF RAISING THE MELTING POINTS OF FATTY ACIDS.

Andrew Solomonoff, of Syracuse, New York, assignor to the Will & Baumer Company. Patent No. 1,002,186, dated August 29, 1911.

This invention relates to a process of hardening fats, stearic acid, palmitic acid and other fatty acids, naphtha acids, commonly known as sludge acid, waxes and the like.

The object of this process is the hardening of such materials for the purpose of raising the melting point and making the material amorphous so that the same may be used for the manufacture of candles; also for the purpose of rendering stearic acid and similar materials hard so that they may be used for insulating and other purposes in the arts.

To illustrate: the best quality of ordinary commercial stearic acid melts at from 128° to 130° F. By this process the melting point is raised and an amorphous condition produced at a very small additional cost.

One concrete method of carrying out this invention is to treat the foregoing materials in either a solid, powdered, or granular form with an anhydrous alkali, either organic or inorganic.

METHOD FOR SATURATING FATTY ACIDS OR THEIR GLYCERIDES WITH HYDROGEN.

Edwin Cuno Kayser, of Cincinnati, Ohio, assignor to the Procter & Gamble Company. Patent No. 1,004,035, dated September 26, 1911.

Though it is known in a general way that unsaturated fatty acids or their glycerides may be converted into the correspond-

ing saturated compounds by treatment with gaseous hydrogen in presence of certain finely divided metals acting as catalyzers, the process cannot be commercially exploited without special methods.

The object of this invention is to provide such methods, and the invention consists in the methods hereinafter described and claimed.

The principal physical and mechanical considerations affecting the practical working of this process are: to bring about and maintain, until the desired transformation be achieved, extensive contact between a mixture of metal and oil and the hydrogen gas, and, moreover, to produce such friction and impingement as will enable the gas to penetrate to the recipient metal in spite of the repellent coating of oil. These conditions are attained by propelling in form of films or spray a comparatively small but ever-changing part of the hot oil-mixture within an atmosphere of hydrogen. While this general principle should be embodied in all apparatus employed to the present purpose, there is considerable latitude in constructive detail.

PROCESS OF MAKING GRANULAR SODIUM BICHROMATE.

Rudolf Caspari, of Uerdingen, Germany, assignor to R. Wedekind & Co., M. B. H. Patent No. 1,003,875, dated September 19, 1911.

The process consists in taking crystallized bichromate of sodium obtained as small crystals by crystallization in motion, or from some similar form of the water-containing salt granulated, *e.g.*, by grinding and screening. The salt freed from its mother-lye by suction filters or centrifugals is gradually heated in a revolving steam-jacketed cylinder or in a vessel with a stirrer placed over a stove, until it reaches the melting point of crystallized bichromate of sodium, or about 110° C., while a sufficient quantity of air is passed over the material to solidify the softening crystals or granulated particles before they cake,

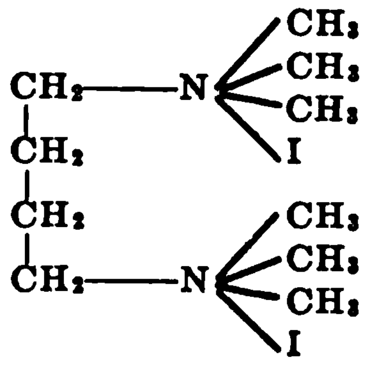
and in order to take away immediately the steam generated. The partly dried material soon commences to roll, as the small crystals or granulated particles readily give off the adhering moisture as well as the water of crystallization. The dehydration proceeds without any material change of the form of the crystals or of the granules and without any formation of dust. According to the percentage of chromic acid desired in the product, the dehydration is either completed or interrupted after it has proceeded to the desired point. In the first case a gradual rise of the temperature to about 130° C. accelerates the process.

PROCESS OF PRODUCING DIVINYL.

Fritz Hofmann and Carl Coutelle, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 1,005,217, dated October 10, 1911.

The process is described as follows:

A solution of 224 parts of potassium hydroxide in 500 parts of water is added to 88 parts of tetramethylenediamine. Then 855 parts of methyliodide are gradually introduced in small portions, the solution being cooled and the mixture is shaken until the combination with the tetramethylenediamine has taken place. The tetramethylenehexamethyldiamine-iodide thus formed of the formula:



is then converted into the corresponding hydrate in the usual way, *e.g.*, by means of oxide of silver. The hydrate is a strongly basic almost colorless oil which hitherto could not be crystallized. It decomposes easily under suitable conditions, even on warming, into water, trimethylamine, and the product known in

literature as divinyl, which can be condensed by sufficient cooling and kept in pressure bombs.

PROCESS OF MAKING BORATES CONTAINING ACTIVE OXYGEN.

Friedrich Ludwig Schmidt, of Charlottenburg, Germany, assignor to the Roessler & Hasslacher Chemical Company. Patent No. 1,006,798, dated October 24, 1911.

The inventor claims that when borax and sodium peroxide are mixed in varying proportions and this mixture is heated, liquefaction takes place under 70°, the active oxygen of the sodium peroxide being given up to the borax. In this way it is possible to produce borates containing active oxygen. The borates containing active oxygen prepared in this way assume a thickly fluid paste on cooling. Solid products can be obtained by adding boric acid to the melt in order to neutralize the alkali hydroxide which is formed.

PROCESS OF MAKING BARIUM OXIDE.

Charles Rollin, of Newcastle-upon-the-Tyne, England. Patent No. 1,008,070, dated November 7, 1911.

In Patent No. 974,921 is described a method of manufacturing barium oxide in a condition specially suitable to admit of its use in the manufacture of barium peroxide, by heating amorphous anhydrous barium hydroxide to a high temperature in a furnace with a barium compound, such as barium peroxide or barium nitrate, capable of evolving gas when heated and of leaving a residue of barium oxide.

To prevent the barium hydroxide, when melted, from dissolving impurities from the material of which the furnace is made and thereby rendering the barium oxide finally obtained, impure, the floor of the furnace is formed of or provided with a firm protective bed of barium oxide. In practice, however, it is found that this protective bed is liable to become disturbed or damaged by the removal therefrom of the finished barium oxide resulting from the heat treatment of the anhydrous barium hy-

droxide, owing to some of such barium oxide having become firmly attached to the protective bed during the heat treatment.

Now the object of the present invention is to prevent or minimize this disadvantage. For this purpose, according thereto, a temporary layer or bed of material that is inert or not injurious to the charge of amorphous anhydrous barium hydroxide to be treated, such, for example, as loose barium oxide, barium peroxide or barium nitrate, or a mixture of any two or all of these barium compounds, is arranged between the protective bed of barium oxide, forming the floor of the furnace, and the charge of anhydrous barium hydroxide to be treated. In this way the barium hydroxide, when melted, is prevented, or is to a large extent prevented, from injuriously affecting the firm protective furnace floor of barium oxide.

METHOD OF SATURATING FATTY ACIDS OR THEIR GLYCERIDES WITH HYDROGEN.

Edwin Cuno Kayser, of Cincinnati, Ohio, assignor to the Procter & Gamble Company. Patent No. 1,008,474, dated November 14, 1911.

It is by now well known that unsaturated fatty acids, their glycerides or other esters, in the fluid state, can be made to absorb gaseous hydrogen, until they become converted into the corresponding semi-saturated or saturated compounds, by the intervention of certain finely divided metals, nickel in particular. For that purpose, the nickel powder is kept in suspension in the hot oil or fatty acid, while hydrogen gas is passed through or otherwise brought in suitable contact with the mixture.

In order to prepare the catalytic agent, suitable soluble or insoluble compounds of nickel are brought in an appropriate manner into intimate combination with an inert absorptive and comparatively bulky mineral substance such as kieselguhr. The product is then dried and powdered and on reduction with hydrogen, a highly efficient and reliable nickelized, inert pulverous material is the result.

In order to carry out the process, introduce into a suitable

closed receptacle a quantity of the mixture of the fatty material and the pulverized, nickelized inert support, and by means of paddles or stirrers, thoroughly agitate the mixture while introducing the hydrogen. The vessel may either be filled with the charge, in which case the gas has to be atomized within the fluid, or the vessel may be only partly filled, so as to permit the agitators or paddles to propel or project the charge into a surrounding atmosphere of hydrogen. By preference, the hydrogen is supplied under pressure, but a certain amount is always allowed to escape continuously in order to carry off generated steam and other gaseous by-products.

TREATMENT OF CELLULOSE.

Henry Peters, of London, England, assignor of one-half to Horace Wayth Cullum. Patent No. 1,008,557, dated November 14, 1911.

This invention relates to the treatment of cellulose whereby the same can be brought into a form particularly adapted for the preparation of solutions capable of application for the manufacture of films, threads, coatings, moulded articles, and the like.

According to the invention the cellulose is heated for some time with dichlorhydrine or epichlorhydrine containing palmitic acid and after cooling the mass of cellulose and removing the adherent dichlorhydrine or epichlorhydrine it is treated with a solution containing formic acid together with a solvent such as methylated spirit and subjected to the action of an acetylizing bath, which may consist in substance of sulphuric acid, sodium acetate, acetic anhydride and a condensing agent such as glacial acetic acid. The resulting cellulose product may then be treated with a neutralizing solution, preferably a solution of ammonium carbonate in a volatile solvent such as methylated spirit, and the product may finally be washed with water containing ammonium carbonate or other neutralizing agent and finally washed with water and dried.

PROCESS OF CONCENTRATING ACIDS.

Ragnar Sohlman, of Bofors, Sweden, and Walter Atkinson Wilson, of Ardeer, Scotland. Patent No. 1,009,196, dated November 21, 1911.

This invention relates to an improved continuous process of concentrating acids, for instance, sulphuric acid, distilling nitric acid from its mixture with sulphuric acid, for instance, the waste acid obtained in the nitration of cotton and the like.

The process consists, chiefly, in having the acid or mixture of acids or the like to be treated flow continuously down through a vertical conduit or column of acid-proof material filled with silica or the like and heated externally, and leading a current of hot air or any other gas in opposite direction through the said conduit or column.

PROCESS OF CONCENTRATING NITRIC ACID.

Ragnar Sohlman, of Bofors, Sweden, and Carl Olof Lundholm, of Ardeer, Scotland. Patent No. 1,009,197, dated November 21, 1911.

The claim covers the process of concentrating weak nitric acid, which consists in making a preliminary concentration of nitric acid by direct contact with a current of hot gases, mixing the nitric acid thus concentrated with concentrated sulphuric acid, and distilling the nitric acid from the mixture and then concentrating the sulphuric acid for re-use in the process, one and the same current of hot gases being successively utilized for concentrating the dilute sulphuric acid, for distilling strong nitric acid from the mixture of nitric and sulphuric acids, and for pre-concentrating the weak nitric acid by direct contact with the hot gases.

PROCESS FOR THE MANUFACTURE OF ALKALI EARTH SALTS OF HYDROXYLAMINE DISULPHONIC ACID.

Friedrich Raschig, of Ludwigshafen-on-the-Rhine, Germany, Patent No. 1,010,177, dated November 28, 1911.

The inventor claims the process for the manufacture of alkali earth salts of hydroxylamine-disulphonic acid, which consists in causing a nitrite of an alkali earth, a bisulphite of an alkali earth, and sulphurous acid to act upon one another in the cold, in the proportions indicated by the equation

$$Ca(NO_2)_2 + Ca(HSO_3)_2 + 2SO_2 = 2HON(SO_3)_2Ca,$$

nitrite and bisulphite being brought together first and the sulphurous acid added afterward.

PROCESS OF RECOVERING SULPHURIC ACID FROM ACID SLUDGE.

John S. Blowski and Alfred A. Blowski, of Oakland, California. Patent No. 1,010,221, dated November 28, 1911.

This invention has reference to improvements in processes for the recovery of sulphuric acid and more particularly for the recovery of sulphuric acid used in the refining of petroleum.

The process consists in liberating the sulphuric acid from petroleum sludge in a dilute condition by means of water, heating said acid in the presence of organic matter contained in said sludge so as to produce sulphur dioxide, purifying said sulphur dioxide and subsequently reoxidizing said sulphur dioxide so as to produce sulphuric acid.

PROCESS OF PRODUCING ALUMINA.

Edward D. Kendall, of Elizabeth, New Jersey, assignor of one-third to E. N. Dickerson. Patent No. 1,013,022, dated December 26, 1911.

The claim covers the process of producing alumina from clays, which process consists in subjecting the natural clay to the chemical action of a solution of caustic alkali under heat and pressure, afterward adding to the mass cream of lime, with renewed application of heat and pressure, then separating by filtration the solution of alkali-metal aluminate so formed, then precipitating alumina from the filtrate by treatment with carbon dioxide at the ordinary temperature, then washing and drying this precipitate.

IV.—MACHINES.

WOOL-WASHING MACHINE.

Frederick G. Sargent, of Graniteville, Massachusetts, assignor to C. G. Sargent's Sons Corporation. Patent No. 982,094, dated January 10, 1911.

This invention relates particularly to the mechanism of wool-washing machines by which the rake or harrow of a machine of such class is operated to advance the wool that is immersed in the liquor, within the bowl or trough, from the feeding end of the bowl or trough to the delivery end.

The claims cover the details of construction.

INDIGO-DYEING VAT.

Henri Chaumat, of Paris, France. Patent No. 981,380, dated January 10, 1911.

This invention relates to a special machine for dyeing by means of indigo, wool previously freed from grease, or any other textile material, raw or spun, and even fabrics.

The dyeing vat comprises a cylindrical metal receptacle closed at the top by a cover which can be folded down and closed in an air-tight manner. Within the said vat are superposed perforated baskets in which are placed the wool or other materials to be dyed. A vacuum is produced in the said receptacle, and a dilute solution of white indigo, as previously mentioned, is introduced through a suction pipe. The impregnation of textile fibres with the solution of white indigo is thus effected in a vacuum. This results in a greatly improved impregnation. After being left in contact a sufficient length of time, the vat is placed in communication with the atmosphere and opened, the baskets are withdrawn, and the wool or other dyed materials is submitted to the ordinary finishing or oxidizing operation.

The claims cover the details of construction.

Patents for the Year 1911

PARALLEL RAKE MOTION FOR WOOL-WASHING MACHINES.

Frederick G. Sargent, of Westford, Massachusetts, assignor to C. R. Sargent's Sons Corporation. Patent No. 982,094, dated January 17, 1911.

This invention relates to an improvement in the power-operating mechanism for wool-washing machines of the well-known Sargent type, in which the counterbalanced rake receives its longitudinal motion from a crank, and is given a vertical motion either from the same crank or by means of a cam, or the like, connected therewith, the latter being shown in U. S. Patent No. 889,157.

The principal objects of the present invention are to provide means whereby the throw of the crank and consequently the longitudinal motion of the rake can be regulated; to provide means whereby the entire motion of the rake can be changed from a reciprocating and rising-and-falling motion to a true rotary motion; to provide for securing a positive downward movement of the rake instead of depending on gravity as has heretofore been the case; to provide an operating means whereby the track on top of the bowl heretofore employed in some constructions can be done away with and to simplify the construction of wool-washing machines of this type.

APPARATUS FOR DYEING LOOSE MATERIAL.

Waldemar Berger, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 983,530, dated February 7, 1911.

The present invention renders it possible to dye in the continuous vat, whereby the output is considerably increased. The uneven dyeing of the loose material in the vat is not only due to the liquor not being squeezed out uniformly when the material is taken out of the vat, but it is chiefly caused by the loose material containing air which prevents an even dyeing. There-

fore, it is important that the loose material should be well pressed within the liquor. However, in this case, the material does not sufficiently absorb the dyeing liquor. This disadvantage is remedied by this machine in which the material passes a willowing-apparatus placed within the bath, by which it is willowed and thereby well exposed to the action of the dyeing liquor.

The loose material is put in a funnel, taken up by feeding-rollers and, after being well divided by the willow, carried between endless perforated bands. By means of these bands the material is passed between the two pairs of pressure-rollers, placed within the liquor, and then conveyed to the willow-roller, whence the thus well-divided material is passed through the liquor by means of the said bands or some other transporting device. The material is passed through the bath more quickly or more slowly, or by a shorter or a longer way, according to the desired intensity of the dyeing. Finally the material is freed from the adhering dyeing liquor by means of a pair of pressure rollers, placed close to the surface of the bath, taken off by another willowing device, and again willowed for the purpose of oxidizing and drying it quickly and uniformly.

WOOL-DRYING APPARATUS.

Joseph M. Spencer, of Philadelphia, Pennsylvania, assignor of one-half to John J. Sweeney. Patent No. 983,577, dated February 7, 1911.

This invention relates to improvements in wool-drying apparatus, the object of the invention being to subject the wool in a thin layer, moved step by step, to the action of heat and air currents to dry and calcine the wool thoroughly.

A further object is to provide an apparatus of this character which economizes space, with improved means for transmitting to the wool a step-by-step feed over perforated plates, beneath which steam coils and perforated air pipes are provided so that the air is forced up through the steam coils and through per-

forations in the plates to subject the wool to the steam-heated air thoroughly, and dry the same perfectly before it emerges from the apparatus.

The machine is provided with improved tooth rakes which act as propellers, and which are given a desired movement to move the wool a predetermined distance at each operation of the rakes.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts.

APPARATUS FOR TREATING TEXTILE FABRICS.

Isaac E. Palmer, of Middletown, Connecticut. Patent No. 985,695, dated February 28, 1911.

This invention relates to apparatus for treating textile material, and, while it may be of general application, is intended more particularly for use in dyeing, bleaching, washing, or boiling material, which may be in the form of warp, either twisted or untwisted, or in the form of woven material, preferably passed through the apparatus in ropy form.

The claims cover the details of construction.

APPARATUS FOR DYEING SKEINS.

Juan Regordosa and Luis Regordosa, of Barcelona, Spain. Patent No. 985,936, dated March 7, 1911.

This invention relates to improvements in apparatus for dyeing skeins, in which the skeins are arranged in continuous rows and are passed through the baths steadily.

The object of the present invention is to separate the threads of each skein as it enters the bath, thus forcing the liquid to circulate between the threads, which results in a more uniform and satisfactory dyeing of the same.

The claims cover the details of construction.

MACHINE FOR DRYING WOOL AND OTHER TEXTILE MATERIALS.

John Francis White, of Bradford, England. Patent No. 986,253, dated March 7, 1911.

This invention relates to improvements in drying machines for drying wool, textile materials, and the like.

The object of the invention is to insure a quick and effective forwarding of the fibre through the machine and a more effective drying of the same, and with this object in view the forwarding tables are built up of sets of longitudinal members, both of which sets are given both horizontal and vertical reciprocations. In order to avoid rubbing between the longitudinal members and the underside of the layer of wool, the horizontal and vertical reciprocating means are arranged independent one of the other, so that these reciprocations, as far as possible, take place at different times, the longitudinal members being for this purpose first raised, then forwarded, then lowered, then forced back, and then raised so as to obtain what may be termed a "square" motion.

Another object is to dry the fibre more effectively by arranging chambers underneath the tables into which hot air is forced and in such a way that it can only escape up through the tables, that is to say, in a direction at right angles to the course in which the fibre is travelling on the tables. To enable this object to be better carried out the forwarding tables are formed with a number of channel irons which are perforated to allow the hot air to pass up through them, and at the same time are so arranged as to form continuously and momentarily a series of air chambers immediately under the fibre, which air chambers are continually being closed and re-formed by the reciprocating action of the channel irons forming the upper part of the tables.

Patents for the Year 1911

REVOLVING COLLAPSIBLE BEAM FOR DYEING MACHINES.

Frank Meluin Morton, of Phœnix, Alabama, assignor of one-third to W. H. Dismuke, and one-third to H. L. Woodruff. Patent No. 987,480, dated March 21, 1911.

This invention relates to improvements in collapsible revolving beams for dyeing machines.

One object of the invention is to provide a beam of this character having an improved means whereby the slats of the beam are expanded and held in an expanded position, whereby the same may be permitted to retract, thus collapsing or reducing the size of the beam before being placed in the dyeing liquid, thereby relieving or slackening the tension of the yarn wound on the slats and permitting the strands of the yarn to open and thus become thoroughly saturated with the dyeing liquid.

Another object is to provide an improved construction and arrangement of slat-supporting heads for the beam whereby the slats are supported and held in position to permit the same to expand and retract.

The claims cover the details of construction.

REVOLVING COLLAPSIBLE BEAM FOR DYEING MACHINES.

Frank Meluin Morton, of Phœnix, Alabama, assignor of one-third to W. H. Dismuke, of Phœnix, Alabama, and one-third to H. L. Woodruff. Patent No. 987,481, dated March 21, 1911.

This invention relates to improvements in collapsible revolving beams for dyeing machines.

One object of the invention is to provide a beam of this character having a simple and improved means for expanding and retracting the slats of the beam for the purpose of allowing the tension of the yarn to slacken, thus permitting the strands to relax and open and thoroughly absorb the dyeing liquid forced through the same.

DYEING APPARATUS.

John C. Evenden and Charles Frohlich, of Amsterdam, New York. Patent No. 988,633, dated April 4, 1911.

This invention relates to apparatus for dyeing, scouring, bleaching, or otherwise treating fibrous material, and it more particularly relates to an improvement in apparatus of this character adapted for dyeing materials such as raw cotton and wool, hosiery, knit underwear, and cops.

One of the objects of the invention is to provide apparatus such that the material treated will be uniformly saturated or impregnated with the dye.

Another object is to provide dyeing apparatus whereby the material to be dyed as well as the dye liquor may be easily and quickly handled.

Another object is to provide mechanism whereby the dye liquid may be utilized repeatedly if desired, and which affords improved facilities for maintaining or changing the temperature of the dye liquid.

A further object is to provide a machine which will occupy a minimum amount of space and which may be operated with little care or attention on the part of the operator.

APPARATUS FOR USE IN DYEING WOUND YARN.

Hermann Resch, Sr., of Lörrach, Germany. Patent No. 990,064, dated April 18, 1911.

This invention consists of a perforated hollow spindle for use in dyeing wound roving or yarn, whereon is secured a spool of yarn or its perforated tube, the said spindle being provided, in addition to the perforations, with external longitudinal and transverse grooves. By forming the spindle in this manner it is possible to fit the spool of yarn to be dyed over its entire length close to the spindle and yet obtain a uniform distribution of the dye liquor throughout. Furthermore, owing to the exact fit of the spool, the spindle forms a strengthening core for the spool

or spools, and affords the necessary support for them even if their tube or shell has a wall of small thickness. In order to prevent the inner layers of yarn from being sucked into the perforations of the yarn-carrying tube on the spindle during the dyeing operation, the said tube is preferably provided with a porous covering of web or the like.

WOOL-WASHING MACHINE.

Georges Malard, of Tourcoing, France. Patent No. 989,622, dated April 18, 1911.

This invention relates to machines for washing wool, and has particular reference to an apparatus which automatically feeds and distributes the wash-water or liquid over a continuous belt-carried mass or sheet of wool which is to be washed or desuinted, such as is disclosed in the prior U. S. Patent No. 851,539.

The object of the invention is to provide an apparatus which is capable of a more perfect washing of the wool, and, furthermore, to simplify and make less cumbersome the washing machine.

DYEING MACHINE.

Joseph Richardson and Jacob F. Neef, of Philadelphia, Pennsylvania. Patent No. 989,644, dated April 18, 1911.

This invention relates to dyeing machines, and it has particular relation to the construction and arrangement of a machine for dyeing raw stock such as ramie, jute in cones, raw wool, raw cotton, and worsted tops.

This machine comprises a tank adapted to contain the dye liquor, which tank may be provided near the bottom with a horizontal diaphragm forming a compartment between the same and the bottom of the tank. Removably mounted in the diaphragm is a material-containing receptacle, which is provided with a zone of perforations mid-way between the respective upper

and lower ends for a purpose to be hereinafter more fully set forth. The lower end of the material-containing receptacle is provided with a perforated bottom, which is preferably arranged a slight distance above the lower end of said receptacle to form thereby a space. The upper end of the material-containing receptacle is closed by means of a cover or lid which may be threaded or otherwise removably secured thereto. The cover or lid of the receptacle may be provided with handles to facilitate the removal thereof. Depending downwardly from the cover or lid is a series of studs which serve to support a perforated diaphragm so as to form a space between said diaphragm and the cover or lid proper. A series of pipes form a communication between the space below the perforated bottom of the receptacle and the upper chamber above the perforated diaphragm which is supported by the cover. Each of the pipes is preferably provided with a valve in such position as to be readily accessible from the top of the tank. A pipe communicates with the interior of the tank above the horizontal diaphragm which supports the material-containing receptacle, and this pipe extends to a circulating pump which is in communication with the chamber in the bottom of the tank by means of a pipe. A drain pipe may also be provided to remove the dye liquor from the machine, and this drain pipe may be controlled by means of a valve.

APPARATUS FOR TREATING YARN IN HANKS WITH LIQUID.

Alexander Clavel, of Basel, Switzerland, assignor to the firm of Färberei-u-Appretürgesellschaft vormals. A. Clavel & Fritz Lindenmeyer. Patent No. 990,802, dated April 25, 1911.

The treatment, especially the dyeing and washing, of yarn in hanks by means of a circulating liquid has hitherto been attended with difficulties for the reason that the yarns could only be treated in the stretched-out form. If the hanks are not stretched for this operation, they will obviously be liable

to get mixed up or otherwise disordered in their usual hanging position. The use of a special stretching device is, therefore, required in this treatment of hanks. Such stretching devices, however, are apt to render more difficult or delay the introduction and taking out of the hanks, and it is, therefore, the object of the present invention to provide means such that the yarn can be treated without making use of special stretching devices. To this end, the treating chamber, which is fitted with means for suspending the hanks, is placed between a suction and a pressure pipe for treating liquid and has said suction pipe distributed over its bottom in such a manner that by a large number of suction openings the suction pipe is so close to the lower ends of the hanks that the latter receive a downward pull or stretching by means of the sucked-in liquid. By this means the hanks may be treated with a circulating liquid in the treating chamber without any special stretching device and without danger of the hanks getting intermingled. The chamber may be provided with a sight opening for inspecting purposes.

The claims cover the details of construction.

DYEING MACHINE.

Alexander Ligget, of Philadelphia, Pennsylvania. Patent No. 992,365, dated May 16, 1911.

This invention relates to a new and useful improvement in dyeing machines, and has for its object to provide a tank or vat in which a slow-revolving, open framework carrying baskets whose sides and ends are formed of wire netting, and to revolve said open framework at a low rate of speed while the centrifugal blades which pass through the centre of the open framework are revolved at a high rate of speed so as to throw the dye liquid outward with sufficient force to drive it into the articles contained in the open framework, thus effecting a more even dyeing action than is usually the case. A still further object of the invention is to draw air from the vat, extract the moisture therefrom, heat this air to a high degree, and force it into the vat

below the liquid level, thus heating and agitating the liquid and causing it to flow from the articles to be dyed in the most effective manner.

Another object of the invention is so to construct the wire baskets that they may be readily placed in position or quickly removed when necessary, and another object is to provide said baskets with a swinging door so that the goods which are being dyed may be removed and other goods placed in the baskets without taking said baskets from the open framework.

PROCESS OF DYEING HAIRS, FURS, AND THE LIKE.

Arnold Erlenbach, of Dessau, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 992,947, dated May 23, 1911.

In dyeing hairs, furs, and the like black shades, aromatic diamines and more especially para-phenylenediamine have been used in combination with an oxidizing agent, such as hydrogen peroxide. The latter para-diamine has extensively been applied in dyeing furs, and the furs dyed with this base whether with or without the aid of a metal salt as a mordant exhibit a coal-black shade, but the shade lacks the bluish tint generally demanded and imparting a bloom to the dyeing. In order to improve the tints obtained by the foregoing method, one has also used a mixture of para-phenylenediamine and of certain meta-diamines, such as, for instance, meta-phenylenediamine or meta-toluylenediamine. Although by oxidation of these bases together with para-phenylenediamine, somewhat more bright and more blue-black tones are obtainable, the dyeings are unstable; when the dyed goods are stored, the dyeing assumes, after some time, a red-brown shade. The inventor claims that the aforesaid objection does not occur if, instead of the above-named meta-diamines, meta-diaminoanisol

$$(OCH_3 : NH_2 : NH_2 = 1 : 2 : 4)$$

or diaminophenetol

$$(OC_2H_5: NH_2: NH_2 = 1: 2: 4)$$

are used. In this new manner, on hairs, furs, and the like bright blue-black tones of great stability are obtained. For instance, apply to the furs a solution which contains in suitable proportions para-phenylenediamine, meta-diamino-anisol, and a suitable oxidizing agent, such as hydrogen peroxide. Similar results are also obtained if, according to this new process, a suitable derivative of para-phenylenediamine, such as para-toluylenediamine, chloro - para - phenylenediamine, methoxy - para - phenylenediamine and the like are employed instead of para-phenylenediamine; thus very useful, brilliant, blue-black dyeings of a great stability are produced.

APPARATUS FOR DYEING OR SIMILARLY TREATING TEXTILES.

John C. Hebden, of Providence, Rhode Island, and Frederick H. Daniell, of Franklin, New Hampshire; Mary B. Daniell, of Franklin, New Hampshire, executrix of said Frederick H. Daniell, deceased. Patent No. 993,324, dated May 23, 1911.

This invention relates to the art of dyeing or similarly treating textiles and consists of an improved apparatus for supporting and confining the material so that pressure may be applied to compress the whole mass to secure a uniform density throughout all portions. It applies particularly to the treatment of slubbing, sliver, roving, lap, or tops. The apparatus provides for dyeing material either in the form of bundles or when loosely coiled upon itself in an irregular mass. The device is shown in the form of a cylindrical container in which the mass of material is compacted about a central, pervious and longitudinally contractible support to provide for compressing the mass longitudinally to bring the material to a uniform density throughout all portions while, at the same time, providing for a central channel through the mass for the passage of the liquid or gas.

The essential feature is the longitudinally compressible casing or container which, while preventing radial expansion of the mass of material, is adapted to contract longitudinally when pressure is applied to the ends of the mass.

APPARATUS FOR DYEING FABRICS.

Léon Derreumaux-Bulteau, of Brussels, Belgium. Patent No. 993,435, dated May 30, 1911.

The present invention has for its object an apparatus for dyeing fabrics providing for the rational reheating of the whole of the dye bath throughout the entire duration of the operation. This reheating reduces to a minimum the expenditure on heating, by the rapid circulation of the dye bath in the various parts of the apparatus facilitated by the provision of inclined false bottoms, forming baffles and distributing in the apparatus the steam liberated by a bubbling device, provided at the bottom of the tank and formed with horizontal holes.

DYEING MACHINE.

Harvey P. Mallison, of Lansdowne, Pennsylvania, assignor to Daniel F. Waters. Patent No. 994,016, dated May 30, 1911.

This invention relates to dyeing machines of the class described in U. S. Patent No. 872,597, comprising a vat wherein yarn is suspended in a dyeing solution while supported upon rotary yarn sticks in a frame which is removable with respect to said vat.

This improvement is particularly directed to the means for circulating the dyeing solution in the vat.

The form of the invention hereinafter described comprises a vat provided with a foraminous false floor and having a casing at one end thereof forming two separate passageways for directing the liquid from the top to the bottom of the vat through ports in opposite vertical walls in said casing; two screw-propeller wheels oppositely disposed in said ports, and respectively having oppositely inclined blades, and a shaft extending hori-

zontally through said ports and operatively connecting said propeller wheels in rigid relation with each other; whereby the liquid is drawn from the top of the vat through said ports, and forced beneath said floor toward the opposite end of the vat when said shaft is rotated.

APPARATUS FOR TREATING CLOTH.

James A. Butler, of Winthrop, Massachusetts. Patent No. 994,245, dated June 6, 1911.

This invention describes improvements in machines or apparatus for treating cloth, previously saturated with dyeing or bleaching solution, to subject the same to the action of the atmosphere as an intermediate step in the process of manufacture.

The object of the invention is to form a stack of cotton or other cloth in a continuous strip formed by attaching ends of the individual pieces together, said strip having previously been subjected to the action of the bleaching or dyeing solutions and being delivered to the present apparatus in rope form, said stack of cloth being so arranged that the cloth may be readily drawn from one end thereof, for the next step in the process.

The claims cover the details of construction.

DYEING APPARATUS.

Thomas Hervey Daniels, of Manchester, England. Patent No. 996,463, dated June 27, 1911.

This invention relates to improvements in rotary dyeing machines of the type well known as Klauder-Weldon machines, with the object of rendering such machines applicable to the dyeing of raw or loose wool, cotton, or other loose material.

In the Klauder-Weldon type of machine as now constructed a rotating drum, divided into compartments by partitions, is mounted in a trough-shaped vessel containing the dye liquor in which the drum is partly immersed. For dyeing loose or raw wool experience shows that this construction is defective, as the

tendency of the wool when packed in the drum and subjected to a constant rolling is to become more or less felted, and, further, it is applicable only for use with a very limited range of dyestuffs.

This invention consists essentially in constructing the rotary drum with a hollow perforated structure in each of the compartments around which the loose wool or other loose material is packed.

The claims cover the details of construction.

DYEING MACHINE.

Jesse M. Payne, of Phœnix, Alabama. Patent No. 996,514, dated June 27, 1911.

The claim covers a dyeing apparatus comprising an inner and an outer tank, a shaft, a reel on the shaft, consisting of flanged disks having spaced notches adapted to receive slats therein, one of the disks having an annular interiorly screw-threaded, projecting concentric flange, a rotatable nozzle extending through the walls of the inner and outer tanks having a flaring screw-threaded end provided with a stop flange to connect with said concentric flange, said flaring end of said nozzle being spaced from said concentric flanged disk, a spider arranged within said nozzle having one end of said shaft mounted therein and an opening in the concentric flanged disk providing communication between the interior of the reel and the nozzle.

APPARATUS FOR DYEING.

August Amrein, of Philadelphia, Pennsylvania. Patent No. 997,360, dated July 11, 1911.

This patent describes a machine suitable for dyeing raw material, such as cotton, wool, and the like, in loose form.

The objects of the invention are to provide a method and apparatus in which all the steps of the dyeing process, including the washing of the dyed stock, are carried on automatically, and

the dyeing proper is accomplished without removing the stock from the dyeing bath or liquor.

It is especially applicable to the dyeing of vat colors, such as direct, sulphur, acid, and chrome colors, and other colors which are liable to be oxidized by being frequently brought into contact with the air while being subjected to the dyeing liquor.

YARN-MERCERIZING MACHINE.

Paul Hahn, of Niederlahnstein, Germany. Patent No. 998,-288, dated July 18, 1911.

In U. S. Patent No. 755,765 of March 29, 1904, is described a yarn-mercerizing machine.

The present invention relates to improvements in such machines, whereby the output of the machine is considerably increased.

A revolver, that is to say a frame turnable around a central axis, is disposed and is adapted to carry on one or both sides several pairs of rollers, the rollers of each pair being capable of being approached and moved away from one another. A driving gear is disposed for periodically turning the revolver through a certain angle and stopping it, so that each pair of rollers on either side of the frame can be consecutively brought into several positions before it returns to the initial position. In the initial position, the two rollers of any pair are brought nearer together and are ready for receiving a hank of yarn, and before the following turn of the revolver the two rollers of the pair are again moved away for preliminary tightening the hank of yarn. In the following several positions of the same pair of rollers the impregnation, the squeezing, the rinsing, and if so desired the repeated squeezing of the yarn can take place consecutively while the yarn is constantly tightened. On the pair of rollers returning to the initial position, the two rollers are again brought nearer together, so that the treated hank of yarn can be exchanged for a fresh hank of yarn. Means are provided for constantly driving the several pairs of rollers ex-

cepting those which occupy their initial position, so that the hanks of yarn can be easily put on and are afterward constantly moved while being treated, whereupon they are again stopped in the initial position of the revolver and can be easily taken off.

DYEING MACHINE.

Charles Frohlich, of Amsterdam, New York, assignor to Klauder-Weldon Dyeing Machine Company. Patent No. 999,304, dated August 1, 1911.

This invention relates to dyeing or scouring machines, and with regard to the more specific features thereof to skein machines.

One of the objects of the invention is to provide such machines with driving mechanism of simple and efficient construction.

Another object of the invention is the production of a skein machine wherein the skeins are passed through the dye liquor or other fluid in a highly efficient and practical manner to the end that the skeins may be uniformly dyed or thoroughly washed.

Another object sought is more efficient movement of the dye-sticks whereby skeins of fine yarn or slubbing may move slowly through the dye liquor and have no more motion than is required to change their position on the sticks.

Another object is the provision of a machine wherein the dye-sticks may have effective movements of rotation and translation at different speeds.

The claims cover the details of construction.

DYEING AND BLEACHING MACHINE.

Tom Frusher and Tom Frusher, Jr., of Brooklyn, New York. Patent No. 1,000,251, dated August 8, 1911.

This invention relates to machines for treating fibrous or other permeable materials with dyeing, fixing, bleaching, washing, or other liquor, and it pertains particularly to machines

of this class in which the material to be treated is packed in a vat and the liquor circulated therethrough.

More specifically, the invention includes a foraminous member through which the liquor is forced into the material, which is usually the bottom member or false bottom, with a portion which extends toward the other foraminous member in increasing cross-sectional dimensions, so that it occupies more space toward the foraminous member through which the liquor is discharged and leaves less space in that portion of the vat for occupancy by material under treatment. The pressure of the entering liquor, in its tendency to force the material toward the opposed foraminous member, will wedge and more tightly pack the material between the sides of the extending portion and of the vat and thus close up any channels that may have formed when the liquor was first caused to flow, with the result that the liquor will be evenly distributed throughout the mass.

DYEING APPARATUS.

Ernest De Journo, of Allentown, Pennsylvania. Patent No. 1,000,589, dated August 15, 1911.

This invention relates to dyeing apparatus, and particularly to apparatus for dyeing silk in the skein.

The main object is to simulate hand dyeing as closely as possible, for the reason that heretofore such hand dyeing, particularly of silk skeins, has been very greatly superior to any dyeing effected by machinery. To this end is provided an apparatus in which the various motions imparted to the skeins in their immersion in the dyeing vat imitate as closely as possible the motions ordinarily made by the hand in hand dyeing.

The invention consists in an improved form and construction of travelling carriage and means for operating the same, in a reversing means whereby the skeins are caused to travel backward and forward as in hand dyeing, and in many novel details of construction and combinations of parts.

DYEING APPARATUS.

William R. Smith, of Buffalo, New York, assignor to Buffalo Leather Co. Patent No. 1,004,486, dated September 26, 1911.

The claims cover:

1. An apparatus comprising an endless horizontal tank, means for moving liquid horizontally therein, and a basket mounted to rotate on a substantially vertical axis in the tank and rotatable by the movement of the liquid therein.

2. An apparatus comprising an endless horizontal tank, means for moving liquid horizontally therein, and a basket mounted to rotate on a substantially vertical axis in the tank, said axis being nearer one side of the tank than the opposite side, whereby liquid moving in the tank is caused to rotate the basket.

3. An apparatus comprising an endless horizontal tank, means for moving liquid horizontally therein, and a basket mounted to rotate on a substantially vertical axis in the tank, said tank having a substantially straight portion and an abruptly curved portion, and the basket being located in said curved portion, whereby liquid moving in the tank is deflected against the outer side of the basket and caused to rotate the latter.

4. An apparatus comprising an endless horizontal tank, means for moving liquid horizontally therein, and a basket mounted to rotate on a substantially vertical axis in the tank, said axis being nearer one side of the tank than the opposite side, and the tank being formed with a substantially straight portion, and with an abruptly curved portion in which the basket is located.

DYEING APPARATUS.

Hubert Eicken, of Grevenbroich, Germany. Patent No. 1,006,-471, dated October 24, 1911.

This invention relates to the class of dyeing apparatus in which the fabric to be dyed is passed between rollers submerged in the dyeing liquid.

It relates especially to the class of dyeing apparatus comprising a tank containing the dyeing liquid, and means in the tank for holding rotatable rolls of fabric to be dyed.

An object of the invention is to provide means whereby the fabric moves with uniform motion through the dye liquid and thereby receives a uniform shade of color.

A further object is to provide means for pressing the dyeing liquid into the fabric; and a still further object is to accomplish the foregoing objects in the most convenient and economical manner.

DYE-TUB APPARATUS.

William M. Rossiter, of Sunbury, Pennsylvania. Patent No. 1,006,502, dated October 24, 1911.

This invention relates to dyeing apparatus, and has special reference to that class of dyeing apparatus in which a vat is employed in conjunction with driving and conveyer rollers.

The invention has special reference to dyeing apparatus which is employed in the dyeing of textile fabrics and especially in the form of strips, bands, or sheets, and has for its object to accomplish a uniform dyeing of the material from end to end and from side to side. Great difficulty has been experienced hitherto in dyeing fabric uniformly on account of the strength of the dye bath varying during the operation of dyeing.

Another object of the invention is to overcome this difficulty by means of which constant strength of the dye bath is practically assured.

Another object of the invention is to apply the dyeing liquid to the fabric in such a manner as to produce a uniform action on every part of the goods.

The claims cover the details of construction.

SKEIN-DYEING MACHINE.

William H. Fletcher, of Paterson, New Jersey. Patent No. 1,008,251, dated November 7, 1911.

The invention comprises a dyeing machine in which there is a revolving frame for holding the goods, slotted bars for supporting skein holders, with means for securing and means for removing said bars with the skeins from the frame in which the skein-holding frame revolves. It also provides oscillating means comprising cams, gears, and pulleys, in combination with an open dye vat to which none of the mechanism is secured, and means for removing the skein holder with the skeins vertically from the liquid, consisting of pulleys, gears, worms, shafting, and drum secured to an overhead framework.

DYEING MACHINE.

Julius Leisel, of Charlotte, North Carolina. Patent No. 1,010,274, dated November 28, 1911.

The invention relates to machines for dyeing cotton and wool in the raw or in the manufactured state, and such, for instance, as shown and described in the U. S. Patent No. 782,147.

The object of the present invention is to provide a new and improved dyeing machine, arranged for dyeing either loose material, or yarns wound on a beam, and provided with a circulating system for circulating dye liquor or clear water through the vat and the material contained therein, and provision is made by an overhead mechanism for manipulating the perforated vat cover and the false bottom, between which the material is laid, the said circulating system having a pump adapted to be driven by a reversible motor, which is also used for actuating the said overhead mechanism in either direction.

REVOLVING, COLLAPSIBLE-BEAM VACUUM DYEING MACHINE.

Frank Meluin Morton, of Phœnix, Alabama. Patent No. 1,010,513, dated December 5, 1911.

This invention relates to improvements in machines for dyeing yarn on a revolving beam or drum, of the class set forth in Patent No. 975,269.

One object of the present invention is to improve the construction and operation of machines of this character, and more particularly the revolving collapsible beam or drum on which the yarn is wound.

Another object of the invention is to provide an improved machine in which the direction of flow of dye liquor may either pass from the interior of the beam outwardly through the yarn, or from the exterior inwardly through the yarn and beam.

V.—MISCELLANEOUS.

MANUFACTURE OF THREADS FROM CUPRO-AMMONIACAL SOLUTIONS OF CELLULOSE.

Albert Lecœur, of Rouen, and Paul Rudolf, of St. Aubin-Jouxte-Boulleng, France, assignors to Le Crinoid Société Anonyme. Patent No. 980,294, dated January 3, 1911.

The claims cover:

1. A process for the manufacture of threads from cupro-ammoniacal solutions of cellulose, comprising precipitation of the threads in an alkaline bath containing formic aldehyde.

2. A process for the manufacture of threads from cupro-ammoniacal solutions of cellulose, comprising precipitation of the threads in a concentrated alkaline bath, as a bath of caustic soda and carbonate of soda, containing about 2 per cent. formic aldehyde.

METHOD OF PRODUCING STABLE SOLUBLE CELLULOSE DERIVATIVES FROM VISCOSE.

Leon Lilienfeld, of Vienna, Austria-Hungary. Patent No. 980,648, dated January 3, 1911.

The inventor claims that products are obtained from viscose (cellulose-xanthogenate) or its derivatives by treating them with

oxidizing agents, particularly with compounds of manganese, which have oxidizing properties. These products are stable in a dry state and dissolve well in dilute alkalis alone or in ammonia or in water particularly when heated, the solubility depending upon the particular salt of the cellulose xanthogenate used, the quantity of the oxidizing agent, and the temperature.

The products and their derivatives, or the solutions of the products and their derivatives, are suitable for all purposes for which dissolved cellulose or soluble cellulose derivatives are suited.

The layers, films, filaments, masses, etc., which are produced with the aid of the present products can be made insoluble in water as required either by suitable precipitating agents, such as acids, metallic salts, etc., or by steam, or by dry heat, or by seasoning through prolonged contact with the air.

APPARATUS FOR MAKING SULPHURIC ACID.

René Moritz, of Wasquehal, France. Patent No. 981,103, dated January 10, 1911.

This patent covers the particular construction described for the purpose of making sulphuric acid by the chamber process.

DIPHENYLENE DIOXIDE.

Rudolf Zaertling and Hermann Friedrich, of Leverkusen, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 981,348, dated January 10, 1911.

This invention relates to a new process for producing diphenylene dioxide, which process consists in heating a salt of ortho-chloro-phenol and distilling off the resulting product in a vacuum.

PROCESS FOR THE CONTINUOUS MANUFACTURE OF CELLULOSE FILMS.

Edwin Brandenberger, of Thaon-les-Vosges, France. Patent No. 981,368, dated January 10, 1911.

This invention describes a process by means of which it is possible to obtain in a continuous manner films of an indefinite length, starting direct from a water solution of cellulose, more particularly from a solution of cellulose xanthate.

For carrying out the process in practice, the cellulose water solution is distributed in the shape of a layer by means of a suitable hopper. It is immediately coagulated by a concentrated water solution of sulphate of ammonia or of other suitable salts. The cellulose layer or sheet is immediately converted into a cellulose film covered with impurities and still soluble in water.

On coming out from the bath of sulphate of ammonia, the cellulose film is brought immediately, without any long contact with the air, into a bath formed by a concentrated or non-concentrated water solution of sodium chloride or of ordinary sea salt. The impurities contained in the film, more particularly sulphides and polysulphides, are dissolved in the said water in which they are consequently retained. Thence, and without the film undergoing a long contact with the air, it is introduced into a third bath formed by a mineral acid, for instance, sulphuric or hydrochloric acid diluted with water. The concentration of this bath will vary from 5 to 40 per cent. acid in accordance with the duration of the time during which the film is kept in it, its thickness, and temperature. In contact with the mineral acid, cellulose xanthate of sodium, if a solution of viscose be used in the beginning, is decomposed and cellulose, insoluble in water, is formed. On coming out from the acid bath, the cellulose film is washed in cold and in hot water.

METHYLKETOBUTANOL.

Georg Merling and Hugo Köhler, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 981,668, dated January 17, 1911.

The inventors claim as a new product methylketobutanol, obtainable by reacting upon methylethylketone with formaldehyde, which is a limpid colorless oil boiling at 90–91° C. at 18 mm.

pressure, soluble in water, alcohol, ether, and benzole, being converted into the acetyl compound on being boiled with acetic acid anhydride, which acetyl compound is a limpid oil boiling at 90–92° C. at 16 mm. pressure.

METHYLENE-ETHYL-METHYL KETONE.

Georg Merling and Hugo Köhler, of Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 981,669, dated January 17, 1911.

This patent describes the production of the hitherto unknown methylene-ethyl-methyl ketone. It is obtained by treating methylketobutanol

$$\begin{array}{l} CH_3 - CO - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - OH \end{array}$$

with dehydrating agents, such as $ZnCl_2$, sulphuric acid, $KHSO_4$, $NaHSO_4$, etc.

It is a limpid strongly refractive oil having a pungent odor and boiling at 98° C. It is soluble with difficulty in water, easily soluble in alcohol, ether and benzene.

PAINT.

Merriweather J. Waugh, of Lincoln, Nebraska. Patent No. 981,902, dated January 17, 1911.

This invention consists primarily in the establishment of means of making a controllable paint coat of heterogeneous chemical and physical structure. A coarse pigment of chemically stable character and crystalline structure is employed to furnish points for capillary action for giving a coat of sufficient thickness. To fill the spaces between these coarse particles, pigments of great fineness are added, both for the purpose of shielding the easily destroyed linoxine (dried linseed oil) from atmospheric action, and to render this oil coat impermeable by gases and moisture. A further function of these fine pigments is to give

hiding power or opacity to the paint. It has been found particularly desirable, in this connection, to employ sublimed white lead for the major pigment, since it is not only an exceedingly fine grained material but in addition it is of great chemical stability. For general exterior use it is necessary to employ a hardening agent in the coat, because the coat made with sublimed white lead or other lead pigment alone is physically too soft to withstand abrasion. This hardness can be secured by the addition of a varnish resin or gum, but more satisfactorily and with greater permanence by the employment of zinc oxide. In the manufacture of this improved climatic paint it has been found that the use of fibrous magnesium silicate in the form, preferably, of comparatively long hair-like crystals of asbestos is desirable since it tends to remain in suspension and to keep the pigments likewise in suspension. A blend of fine pigments with pigments of moderately angular crystallinity is the only mix so far found which brushes uniformly. This characteristic is of considerable commercial importance, and it is to secure a proper modification of this brushing character that the fourth pigment is added in the practice of this invention. The fourth pigment referred to is a matter for selection, the essential being that it should be crystalline with rather obtuse angles, it having been shown that materials of acute angular fracture, as quartz or flint, exert too much of a retarding or holding influence on the brush, thus making the labor of application excessive. The available materials are as follows: calcite (calcium carbonate), talc (a tubular magnesium silicate), china clay or kaoline (hydrated aluminum silicate), barytes (native barium sulphate), aragonite and other forms of calcium carbonate (a special significance is claimed for calcium carbonate, in that it is generally believed that it has the power of neutralizing the free acids existing in the oil), plaster-of-paris (anhydrous calcium sulphate), dolomite and other mixed carbonates, feldspar and other complex silicates.

PAINT AND VARNISH REMOVER.

James S. Patty, of Chicago, Illinois, assignor to the Ohio Varnish Company. Patent No. 982,524, dated January 24, 1911.

This composition consists of a phenolate in solution and associated with a solvent for the gums or constituents of the varnish or paint. When such a composition is applied to a varnished surface, for example, the phenolate disintegrates the gum of the varnish and the solvent referred to dissolves the destroyed gum. Such a solvent is employed that the resultant body is readily miscible with water, so that it may be washed from the surface. The composition acts with great rapidity, resulting in a comparatively small amount being lost by evaporation.

In making the composition a phenolate of sodium is preferred. This is mixed with a substance which is a suitable solvent or carrier for the gum or paint, as alcohol. The phenolate, however, is not soluble in such substance, and to render it soluble a suitable alkali is added, as, for example, a small quantity of aqua ammonia. This causes the phenolate to go into solution.

BLEACHING COMPOSITION.

Armand Steigelmann and Erich Dehnel, of Ludwigshafen-on-the Rhine, Germany, assignors to Badische Aniline & Soda Fabrik. Patent No. 984,312, dated February 14, 1911.

The inventors claim a new composition of matter which consists of solid anhydrous sodium hydrosulphite and zinc dust, and which can be used as a bleaching agent. The solid anhydrous sodium hydrosulphite can be obtained, for example, according to the process claimed in Patent No. 795,755, and in the pure state possesses a composition corresponding to the formula $Na_2S_2O_4$. This new bleaching agent is as stable in the form of powder as the solid anhydrous sodium hydrosulphite itself and possesses advantages over this body in some of its applications. In particular, the solutions obtained by mixing the new agent with water are more stable than are sodium hydrosulphite solutions free from zinc dust, and, further, they have a greater bleaching action

in some cases. The new mixture is preferable to anhydrous sodium hydrosulphite itself for bleaching purposes in cases where the bleaching action has to be prolonged, for the greater stability of the solutions makes their use more economical than that of sodium hydrosulphite itself, the solutions of which rapidly deteriorate in activity. Thus the new agent is especially useful for bleaching leather, glue, and feathers and the cheaper varieties of straw.

MINERAL PAINT.

Minas D. Giffin, Arthur G. Wingley, Terence Cassidy, and James Cassidy, of Butte, Montana. Patent No. 984,477, dated February 14, 1911.

The claims cover:

1. A process of making paint, which consists in dissolving elaterite with boiled oil and gilsonite with turpentine, and combining the minerals by mixing and boiling with sulphur.

2. The process of making paint which consists in boiling a quantity of gilsonite and turpentine, dissolving an equal quantity of elaterite in boiled oil, adding the two quantities, adding a quantity of sulphur and combining the mixture by boiling until the sulphur is combined, and then adding tallow and ozokerite.

PAINT AND VARNISH REMOVER.

Carleton Ellis, of Larchmont, New York, assignor to the Chadeloid Chemical Company. Patent No. 985,414, dated February 28, 1911.

This invention relates to paint and varnish removers and relates especially to removers of paint or varnish comprising esters of the hydroxy acids. An illustrative composition suitable for general work consists of amyl tartaric ester, 4 parts, turpentine, 4 parts, oil of acetone, 4 parts, and paraffine or ceresine wax, 1 part, these ingredients being suitably combined and thoroughly incorporated, preferably under gentle heat, although

in some instances the wax may be omitted from this remover where high consistency is not desired. Another illustrative composition, which may be similarly compounded and which is suitable for removing shellac finish, may comprise amyl lactic ester, 16 parts, methyl ethyl ketone, 16 parts, denatured alcohol, 20 parts, amyl acetate, 8 parts, fullers' earth, 8 parts, Japan wax, 2 parts, and sodium stearate, 1 part, although under some circumstances the waxy bodies mentioned and also the other thickening material may be omitted.

PAINT AND VARNISH REMOVER.

Carleton Ellis, of White Plains, New York, assignor to Chadeloid Chemical Company. Patent No. 985,405, dated February 28, 1911.

This invention relates to paint or varnish removers and relates especially to removers comprising volatile organic solvent material combined with crystalline organic solid material to retard the evaporation thereof. Many crystalline evaporation-retarding organic bodies may be used in this way, including the chlornaphthalenes, camphors, and other solid terpene bodies of a non-resinous character or acetanilide, adipic acid, amido benzoic acid, betol, benzonaphthol, beta naphthol, menthol, acetophenone, oleic ozonides, that is, the bodies formed by the reaction of ozone on oleic acid, naphthalene, and derivatives, such as phenyl salicylate, calcium salicylate, aluminum benzoate, as well as other bodies of the aliphatic and aromatic series. Many of these bodies decrease the inflammability of volatile solvent removers by reducing the vapor tension and some of these illustrative retarding agents, such as the chlornaphthalenes, are non-inflammable.

PAINT AND VARNISH REMOVER.

Otto E. Enell, of Chicago, Illinois, assignor to the Chadeloid Chemical Company. Patent No. 985,407, dated February 28, 1911.

This invention relates to paint and varnish removers and

relates especially to compositions comprising volatile solvents with which, preferably, some waxy bodies and caustic material have been incorporated.

Illustrative removers of this character may be prepared according to the following formula: wood alcohol, 20 parts, carbon tetrachloride, 2 parts, caustic potash, about 1 part, benzol, 25 parts, ceresine, 2 parts, oleic acid, 2 parts. Another good remover may comprise commercial acetone from the distillation of wood, 25 parts, caustic potash, about 1 part, benzol, 20 parts, turpentine, 10 parts, ceresine, 3 parts.

PAINT.

Merriweather J. Waugh, of Lincoln, Nebraska. Patent No. 987,605, dated March 21, 1911.

The claims cover:

1. In combination with a suitable paint vehicle, a major pigment composed of approximately 71 per cent. sublimed white lead, approximately 18.25 per cent. zinc oxide, approximately 7.75 per cent. fibrous magnesium silicate, and a fourth pigment, substantially 3 per cent., crystalline in character and of rather obtuse angular formation for facilitating the application of the paint.

2. In combination with a suitable paint vehicle, a major pigment composed of approximately 71 per cent. sublimed white lead, approximately 18.25 per cent. zinc oxide, approximately 7.75 per cent. fibrous magnesium silicate, and approximately 3 per cent. of crystallized calcium carbonate of rather obtuse angular formation for facilitating the application of the paint.

PAINT.

Merriweather J. Waugh, of Lincoln, Nebraska. Patent No. 987,606, dated March 21, 1911.

The patent describes a paint consisting of:

1. In combination with a suitable paint vehicle, a major pigment composed of approximately 72 per cent. sublimed white lead, approximately 15 per cent. zinc oxide, approximately 9 per

cent. fibrous magnesium silicate, and a fourth pigment, substantially 4 per cent., crystalline in character and of rather obtuse angular formation for facilitating the application of the paint.

2. In combination with a suitable paint vehicle, a major pigment composed of approximately 72 per cent. sublimed white lead, approximately 15 per cent. zinc oxide, approximately 9 per per cent. fibrous magnesium silicate, and approximately 4 per cent. of crystallized calcium carbonate of rather obtuse angular formation for facilitating the application of the paint.

PAINT.

Merriweather J. Waugh, of Lincoln, Nebraska. Patent No. 987,607, dated March 21, 1911.

The inventor claims:

1. In combination with a suitable paint vehicle, a major pigment composed of approximately 60 per cent. sublimed white lead, approximately 30 per cent. zinc oxide, approximately 7 per cent. fibrous magnesium silicate, and a fourth pigment, substantially 3 per cent., crystalline in character and of rather obtuse angular formation for facilitating the application of the paint.

2. In combination with a suitable paint vehicle, a major pigment composed of approximately 60 per cent. sublimed white lead, approximately 30 per cent. zinc oxide, approximately 7 per cent. fibrous magnesium silicate and approximately 3 per cent. of crystallized calcium carbonate of rather obtuse angular formation for facilitating the application of the paint.

PAINT.

Merriweather J. Waugh, of Lincoln, Nebraska. Patent No. 987,608, dated March 21, 1911.

The claims cover:

1. In combination with a suitable paint vehicle, a major pigment composed of approximately 75 per cent. sublimed white lead, approximately 10 per cent. zinc oxide, approximately 10 per cent. fibrous magnesium silicate, and a fourth pigment, sub-

stantially 5 per cent., crystalline in character and of rather obtuse angular formation, for facilitating the application of the paint.

2. In combination with a suitable paint vehicle, a major pigment composed of approximately 75 per cent. sublimed white lead, approximately 10 per cent. zinc oxide, approximately 10 per cent. fibrous magnesium silicate and approximately 5 per cent. of crystallized calcium carbonate of rather obtuse angular formation for facilitating the application of the paint.

INHIBITIVE PIGMENT AND METHOD OF MAKING SAME.

Allerton S. Cushman, of Washington, District of Columbia. Patent No. 987,965, dated March 28, 1911.

This invention relates to methods of treating pigments whereby they may be freed from stimulative acids or salts, if such be present, and also rendered positively inhibitive, or improved as to their inhibitive qualities, by incorporating with the pigment particles, and particularly with the surface portion of such particles, the chromic acid radical.

To carry the method into effect proceed as follows: about 15 parts of potassium or sodium bichromate, or other soluble salt containing the chromic acid radical, are dissolved in 100 parts of water, and to this solution is added the pigment to be chromated. The proportion of pigment to solution is immaterial, provided the pigment is thoroughly wet by the solution. The concentration of the solution may also be widely varied. The mass is thoroughly stirred, and the chemical action may be expedited by heating. The chromate solution may be acid, neutral, or alkaline, but should be, as nearly as practicable, free from strong mineral acids, such as hydrochloric or sulphuric acids or their soluble salts. After treatment for a suitable time, depending upon the nature of the pigment, the solution is eliminated by filtration or otherwise, and the pigment dried, with or without previous washing with water. Examination of the pigment, after treatment as above, shows that the surfaces of the particles

contain the chromic acid radical. The superficial character of the action may be shown in the case of most pigments by rubbing the treated pigment in a mortar or otherwise crushing or abrading the particles, when the differing colors of the original and modified portions of the pigment particles will be made apparent. Certain pigments, by sufficiently prolonged treatment, may be converted completely into chromate, but such conversion is not as a rule economical or desirable. The time of treatment will, of course, vary according to the character of the pigment treated.

The pigments used are such as are capable of taking up at least a small proportion of the chromic acid radical, either physically or chemically, usually chemically. Hence the pigments treated are generally basic in character or contain metallic oxides, as, for example, zinc oxide, white or red lead, litharge, calcium carbonate, slag pigments, oxides of iron, etc.

PROCESS OF MANUFACTURING NEW ORGANIC FATTY ACID COMPOUNDS.

Heinrich Rössner and William Cotton, of Höchst-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Brüning. Patent No. 988,032, dated March 28, 1911.

According to this invention, by treating unsaturated fatty acids of high molecular weight with aldehydes or ketones, that is to say, with neutral compounds containing the carbonyl group, which renders them capable of combining with phenylhydrazine and hydroxylamine, new chemical compounds are formed which are soluble in alkalis and very stable in the cold. The reaction is carried out with the addition of condensing agents. These new compounds have the surprising, and in practice extremely important, property of reacting when hot like the free fatty acids. This property has led to a valuable new process in alizarine printing. Certain alizarine dyestuffs, such as alizarine-red, alizarine-pink, and alizarine-orange could hitherto only be printed on goods which had previously been prepared with

Turkey-red oil or the like. As this oil preparation is expensive and causes extra labor to the printer, it has already frequently been attempted to simplify the process in various ways. Among others the addition of Turkey-red oil to the printing colors has been proposed; this has, however, proved to be impracticable, as in this case the color lake is formed already in the printing color and thus prints are obtained which are not fast. On adding free fatty acids, the formation of the lake in the printing color can be avoided, but the effects obtained are not equal in brightness to the prints on goods which have been previously oiled.

On adding the above-mentioned new compounds of the fatty acids to the printing color, color lakes are not formed in the printing colors and the latter keep for any length of time. When the printed goods are steamed, the fatty compound enters the color lake.

Besides simplifying the method of working, the new process offers another advantage in that the non-printed parts do not turn yellow, as is the case with previously oiled goods when kept for some time.

The new compounds may be added directly to the printing color, or they can be formed in the printing colors themselves. Among the aldehydes, formaldehyde is particularly suitable; acetaldehyde, benzaldehyde, and others are also suitable. Of the ketones, acetone is especially suitable. In the place of the free fatty acids, the respective fats may also be employed; these are partly transformed during the process into the free acids.

PROCESS FOR REMOVING PRINTERS' INK FROM PRINTED PAPER BY MEANS OF BLEACHING SUBSTANCES HAVING AN ALKALINE ACTION.

Hugo Henkel, of Dusseldorf, and Otto Gessler, of Augsburg, Germany. Patent No. 988,874, dated April 4, 1911.

The process chiefly consists in the soaked and divided paper

being treated in an alkaline solution of peroxides in the presence of substances which, during the process, pass into a colloidal state. As peroxides, the peroxides of alkalis or of earth alkalis may be employed, as, for instance, sodium superoxide Na_2O_2, sodium perborate $NaBo_4 + 4HO_2$, sodium persulphate $Na_2S_2O_8$, potassium superoxide K_2O_2, potassium perborate, potassium persulphate, magnesium superoxide MgO_2, barium superoxide BaO_2, and the like. As colloidal substances, either silicic acid, already in colloidal state, can be added or compounds can be used which, during the process, pass into the colloidal state, for instance, silicates, alumina compounds, and the like. The silicic acid develops in a colloid state as the hydrosol of the acid passes over into the hydrogel of the acid. Fine transparent flakes are then formed which may be called colloid silicic acid. It is preferred to employ the so-called soluble silicic acid which is on the market and consists of a compound of water-glass and soda, which, upon being dissolved in water, undergoes a hydrolytic decomposition of such nature that the silicic acid is precipitated in colloidal form. This precipitation of the silicic acid commences after a few minutes and is completed within four or five hours. Of course, the rapidity of this precipitation depends upon the concentration and the temperature. Newly precipitated aluminum hydroxide $Al(OH)_3 + xH_2O$ acts in the same manner.

It has been found that the fat contained in printers' ink is modified in the alkaline solution of the superoxides in such manner that it loses its binding or cementing force, whereupon it becomes possible for the printers' ink to be converted into an emulsion by the colloidal silicic acid and thus easily separated from the fibres.

SOLVENT FOR ACETYL CELLULOSE.

Theodor Becker, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 988,965, dated April 11, 1911.

In the treatment of cellulose esters and the production of

solutions for the manufacture of lacquers or varnishes, photographic films, and other flexible and plastic compounds, the inventor has found that dichlorethylene has no or only very low dissolving power for the cellulose esters which are suitable for the manufacture of lacquers or varnishes, photographic films, and other flexible and plastic compounds but that dichlorethylene in conjunction with alcohol, with or without the addition of other solvents, such as acetone, chloroform, etc., furnishes solutions which are useful for all the purposes defined above.

PROCESS FOR REMOVING INK OR COLORING MATTER FROM PAPER.

William B. Meixell, of Sayre, Pennsylvania, assignor of one-third to James B. Stalnaker and one-third to Thomas Wheeler Jenkins. Patent No. 989,023, dated April 11, 1911.

In carrying out the process the paper is taken with the printed or coloring matter theron, and, preferably, is treated in a rotary steam "cooker" so as to soften the ink. The paper is then put in the beaters and is beaten up into pulp with either hot or cold water. When the paper has been finely divided a mixture of water and common whiting, *i.e.*, levigated or unlevigated chalk is passed into the beater. If the former is used the action is quicker, although the ground chalk may be used for the same purpose. The precise action of the whiting on the ink or coloring matter is not known. It is presumed that there is both a chemical and a mechanical action. As soon as the mixture of the whiting, water, and paper pulp has been thoroughly beaten in the beaters, the pulp is passed on to other beaters, where it is thoroughly washed. The washing tends to drain out the ink, coloring matter, and the whiting, and each subsequent washing leaves the pulp whiter than before, until finally the pulp is restored to its original whiteness. It can now be passed on to the paper machines and the paper prepared from it will be, as stated before, in all respects equal to that prepared from freshly made pulp.

OIL AND COMPOUND THEREOF.

William N. Blakeman, Jr., of New York, N. Y. Patent No. 989,225, dated April 11, 1911.

The object of this invention is to treat oils in such a manner that, when a pigment is ground therein, a paint will be formed which will dry satisfactorily and be durable and permanent.

The invention consists in chlorinating an oil before a pigment is ground therein.

Any of the drying fatty oils, such as linseed, hemp, poppy, or tung, or the non-drying fatty oils, such as cotton, sunflower, and corn, may be chlorinated in carrying out my invention.

Taking cotton oil, for example, chlorinate it by passing chlorine through the mass of oil, arranged in a tall column, until a slight change of color in the oil is apparent; or by exposing the oil in broad surfaces to the action of chlorine, using heat, pressure, and agitation if necessary; or by subjecting the oil to any other suitable chlorinating process.

When the oil has been chlorinated, grind therein one or more pigments, and, preferably, those which are ordinarily deficient in spreading power when ground in oil, such as zinc oxide, zinc sulphide, lead carbonate, lead sulphate, lead sulphite, sublimed lead, barium carbonate and barium sulphate. It will be found to be of decided advantage to use an oxide or a sulphide which for the purpose is the equivalent of an oxide either as a sole pigment or combined with others, as oxides and sulphides appear to form a more satisfactory combination with the chlorinated oil.

A drying oil, raw or oxidized, such as linseed or tung, or a commercial drier, or both, may be added to the compound to accelerate its drying when spread as a paint.

OIL AND COMPOUND THEREOF.

William N. Blakeman, Jr., of New York, N. Y. Patent No. 989,226, dated April 11, 1911.

The invention consists in incorporating with a fatty oil,

before a pigment is ground therein, a chlorinated fatty substance, as will now be described in detail and then set forth in the claims.

In carrying out the invention a chlorinated fatty agent is first formed, and for this purpose there may be employed any of the drying fatty oils, such as linseed, hemp, poppy, or tung, the non-drying fatty oils, such as cotton, sunflower, and corn, the rosin oils, or a constituent or derivative of these substances, such as oleic acid, stearine, and stearic acid, preferably either linseed, tung, or rosin oil.

Selecting tung oil as an example, treat it with chlorine in any manner that shall give a satisfactory product, such as by passing chlorine through the oil, arranged in a tall column; by exposing the oil, in broad surfaces, to the action of chlorine; or by subjecting the oil to any other suitable chlorinating process that will produce a chlorinated agent. After thoroughly washing the product any desired proportion is mixed with the fatty oil to be used as a paint vehicle, thoroughly commingling and blending the same, and then grind in this vehicle the pigment or pigments to be used. Pigments which ordinarily are deficient in spreading power when ground in oil, such as zinc oxide, zinc sulphide, lead carbonate, lead sulphate, lead sulphite, sublimed lead, barium sulphate, or barium carbonate, give the best results when an oxide or sulphide is used either as a sole pigment or combined with others, as oxides and sulphides appear to form more satisfactory combinations with the chlorinated agent. For the purpose a sulphide is the equivalent of an oxide. A drying oil, raw or oxidized, such as linseed or tung, or a commercial drier, or both, may be added to the compound to accelerate its drying when spread as a paint.

OIL AND COMPOUND THEREOF.

William N. Blakeman, Jr., of New York, N. Y. Patent No. 989,227, dated April 11, 1911.

The object of this invention is to treat oils and fats in such a manner that their field of usefulness will be greatly broadened.

and that, when properly compounded, they may be used for purposes in the arts for which they are not now adapted, namely: to fix and bind the vehicle, sometimes called the bond, in transparent, opalescent, and opaque glacé film; as a magma for comminuted vegetable, metallic, and mineral matter, in linoleum, oil-cloth, roofing, paving, and artificial lumber manufacture; as a mastic for fatty cements and putty; and as a general, very stable, agglutinant.

The invention consists in combining with an oil or fat, or a derivative of an oil or fat, a hydrocarbon chloride with or without the addition of amorphous or comminuted matter; and by the term hydrocarbon chloride is included not only chlorinated hydrocarbons, but also all chlorinated derivatives of hydrocarbons.

Any of the drying oils, the non-drying oils, the rosin oils, or their derivatives, may be treated by the invention. The oils preferably used are linseed, tung, cotton, sunflower, corn, and menhaden, and their derivatives.

PAPER.

Knight E. Rogers, of South Manchester, Connecticut. Patent No. 989,425, dated April 11, 1911.

The claims cover:

1. Paper impregnated with a lubricant consisting of a soluble, fatty-acid soap, there being about 2 per cent. of said lubricant to the paper material.

2. Paper impregnated with a lubricant, there being not over 5 per cent. of said lubricant to the paper material, said lubricant consisting of a soluble, fatty-acid soap.

3. Paper impregnated with a lubricant consisting of a soluble, fatty-acid soap having a friction-finished surface.

4. Paper impregnated with a lubricant, there being not more than 5 per cent. of lubricant to the paper material, said lubricant consisting of a soluble, fatty-acid soap and the paper having a friction-finished surface.

Patents for the Year 1911

NAP-RAISING DETERGENT AND DISINFECTANT FOR WORN WOOLENS, SERGES, AND OTHER GOODS.

Charles A. McKinnon, of St. Louis, Missouri, assignor by direct and mesne assignments, to McTan Chemical Company. Patent No. 991,869, dated May 9, 1911.

The preferred formula for the product consists of commercial carbolic acid, one quart, ammonia (aqua), one pint, crystallized bluestone, one ounce, powdered borax, one ounce, water, two and one-half quarts, and lampblack, one hundred and fifty grains.

The inventor claims that the said ingredients so co-act as to form a composition of matter which will clean, disinfect, and raise a nap on worn woolens, serges, cheviots, broadcloth, and other similar or analogous goods. By the use of this composition the said goods are in no way damaged or caused to fade; on the contrary, by the use of this composition, the goods are so thoroughly cleaned, brightened, the original color being preserved, and given a new nap, as to present an appearance of newness. This new nap is found to be fairly lasting; and when the goods again become worn or soiled, they may again be cleaned and given a new nap by the composition, and so on until the said goods are finally worn out from usage.

PAINT AND PIGMENT.

Maurice Herisson, of Paris, France, assignor of one-half to John Ferreol Mönnot. Patent No. 992,335, dated May 16, 1911.

It is the object of the present invention to produce a pigment which while entering into intimate union with the linseed oil, in case that vehicle is used, nevertheless forms an absolutely permanent paint, not suffering from contact with air, acid gases, or sulphur compounds, forming a paint which spreads well, flows freely from the brush, and is durable. To this end a pigment is produced which comprises a hydrated, precipitated silicate of barium of certain characteristics in combination with

certain other pigment and paint-forming bodies, said silicate having been partially dehydrated at a low temperature but still retaining sufficient water of constitution to enable it to be chemically reactive.

PAINT COMPOUND.

George F. Smith, of Covington, Virginia. Patent No. 992,-609, dated May 16, 1911.

This invention relates to an improved paint compound for use in painting metallic and other surfaces.

The improved paint consists of asphaltum (of commerce) and cymene oil—a sulphite pulp residue of the terpene class, differing from turpentine in being materially less volatile and more highly adhesive.

In the manufacture of the improved paint compound, a sufficient amount of the cymene oil is combined with the asphaltum, by stirring or agitation, to reduce the compound to the required consistency for use, the resultant compound being readily and cheaply produced, very brilliant and exceedingly durable.

KESSLER APPARATUS FOR CONCENTRATING SULPHURIC ACID.

Jules Teisset and Jules Prat, of Paris, France. Patent No. 993,125, dated May 23, 1911.

This invention relates to improvements in the construction of Kessler's apparatus for concentrating sulphuric acid.

It relates, further, to its combination with an external ventilator, for obtaining a better draft, and thereby increasing the yield in sulphuric acid.

It relates also to a special construction of the saturator, or final concentrator, and its relation to the concentrating column, or preliminary concentrator, whereby gradual heating is applied to the saturator, which plays the principal part in the concentration of sulphuric acid.

COMPOSITION FOR WATERPROOFING AND PRESERVING LEATHER.

Charles L. Miller, of Lynn, Massachusetts, assignor to Andrew O. Vestine. Patent No. 993,315, dated May 23, 1911.

This invention relates to compositions for waterproofing leather and similar substances and rendering the same more durable.

An efficient composition embodying this invention comprises the following ingredients, preferably in about the proportions indicated: viz. pine tar 10 per cent.; blue vitriol, 2 per cent.; linseed oil, 60 per cent.; japan, 28 per cent. In this composition leather is immersed and, as a result, it is rendered waterproof and tough.

The proportions of the different ingredients used may be varied to adapt the composition for use with leather of different kinds and quality, and also to produce the desired degree of hardness in the leather, without departing from the spirit and scope of the invention. Leather of good quality and fine grain should be immersed for fifteen to thirty minutes, if the composition is used cold, the length of time being determined by the degree of hardness required to be imparted to the leather.

MISCIBLE OIL.

Carleton Ellis, of Montclair, New Jersey. Patent No. 993,-827, dated May 30, 1911.

This invention relates to miscible oils adapted for use as vegetation sprays, sheep dips, and the like and relates in particular to miscible oils containing copper or other metallic base in actual solution therein.

The metallo-organic compound of a water-insoluble character preferably is secured by making soap from among the metals mentioned, as, for example, copper soap may be made by precipitating sodium oleate with copper sulphate, or by heating copper carbonate or hydroxide with red oil or oleic acid to a

temperature of about 200° C. for an hour or more metallo-organic oil-soluble compounds are produced. For example, two parts of red oil, one part of guayule resin, and one part of finely powdered carbonate of copper are heated to a temperature of 140° to 180° C. with the result that the carbonate dissolves to a very large extent, forming a copper soap containing copper oleate and copper "guayulate" or some combination of copper with guayule resin. This metallo-organic compound of copper dissolves very readily in oils and should be added to the oil basis used in making the miscible oil. Preferably, the metallo-organic compound as specified is made and this is introduced with rosin and oleic acid into a kettle. Heat is applied and the mixture melted. Kerosene, heavy petroleum, or other oil, preferably, together with some creosote, is added and finally a concentrated potash-soap mixture is added and the mixture stirred until the ingredients are blended to a clear solution of a permanent character.

HALOGENIZED CARBOXYLIC ACID OF THE PHENYLAMINO-ANTHRAQUINONE SERIES.

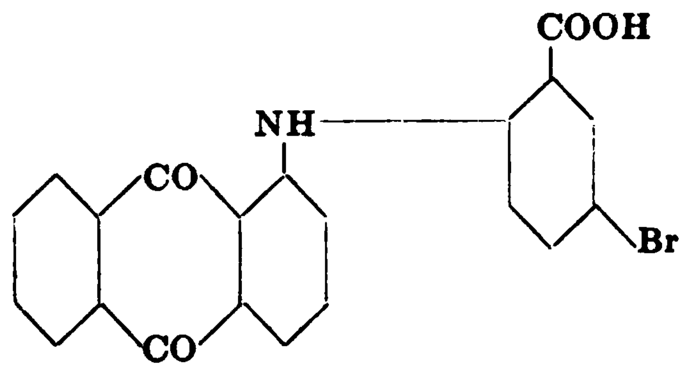
Fritz Ullman, of Charlottenburg, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 993,915, dated May 30, 1911.

According to the present invention new halogenized carboxylic acids of the phenylamino-anthraquinone series are obtained, which contain a halogen atom and which are very valuable parent materials for the manufacture of vat dyes as well as of intermediate products for such dyes.

This invention is based on the observation that alpha-chloroanthraquinone reacts with a halogenized anthranilic acid forming thus a halogenized alpha-anilidoanthraquinone carboxylic acid.

In performing the reaction a substance capable of absorbing the hydrochloric acid formed during the reaction and a body possessing a so-called catalytic function are added.

The claims specify bromo-alpha-anilido-anthraquinone-carboxylic acid of the formula:



PAINT AND VARNISH REMOVER.

Carleton Ellis, of White Plains, New York, assignor to Chadeloid Chemical Company. Patent No. 994,139, dated June 6, 1911.

This invention relates to paint and varnish removers and relates especially to removers comprising butyrone and its isomers, the other heptyl ketones having the formula $C_7H_{14}O$.

A desirable remover may be prepared by dissolving six parts of paraffine or ceresine wax in 25 parts of benzol or its homologues, or similar hydrocarbon wax solvents and then incorporating 75 parts of heptyl ketones, preferably butyrone, and 25 parts of wood alcohol or other similar alcoholic bodies, although such ingredients may, of course, be combined in any order and incorporated by heating and agitation. It is, of course, unnecessary in all cases to employ the benzol or similar solvents or the wax mentioned, and other stiffening material may naturally be substituted for the wax when desired for many classes of work.

Another desirable remover may be made by incorporating two parts of waxy bodies, such as, for example, paraffine or ceresine wax, with 90 parts of heptyl ketones, preferably butyrone, and suitable stiffening material may be used in the form of eight parts of wood flour, the lightest air-separated product derived from sawdust and similar material being most desirable, although, of course, the wax may also be omitted in some cases.

FIBRE-PRODUCING PROCESS AND RESULTING FIBRE MATERIAL.

Viggo Drewsen, of New York, N. Y. Patent No. 996,225, dated June 27, 1911.

This invention relates to fibre-producing processes and resulting fibrous material and relates especially to processes of producing fibre suitable for paper manufacture and other purposes from vegetable fibre material such as wood, straw, bagasse, bamboo, cornstalk, cotton, flax, ramie, and other material, as, for example, by boiling the same under pressure, preferably in the presence of free lime or similarly acting earthy alkalis, in suitable strength treating solutions of loosely combined sulphur such as soluble polysulphides of the alkaline earths to decompose the vegetable material and form a sulphuretted fibrous transition compound, and then, if desired, by eliminating organic sulphur components from this transition compound by treatment with a suitable sulphur eliminating agent.

PRODUCTION OF ANHYDROUS ETHYL ALCOHOL.

Jacob Heinrich Hess, of Griesheim, Germany, assignor to Chemische Fabrik Griesheim-Elektron. Patent No. 996,763, dated July 4, 1911.

The inventor has found that sodium sulphide (Na_2S) free from water is a much better dehydrating substance for ethyl alcohol than any of those usually employed. Over the same it has the following advantages: 1. It is quite indifferent against ethyl alcohol. 2. Therefore all of the alcohol can be recovered in a concentrated state of practically 100 per cent. 3. It dehydrates the ethyl alcohol perfectly within a very short time. 4. After the anhydrous ethyl alcohol has been distilled off, the remaining sulphide can, by simply heating, be freed from the water it has absorbed and can so be used over and over again.

SIZING COMPOUND.

Seymour M. Hermann, of New York, N. Y. Patent No. 997,294, dated July 11, 1911.

The object of this invention is to produce a new composition for the purpose of sizing various articles, especially designed to be used on paper, and which compound will be much cheaper to manufacture than those at present in use, yet will produce the same effects, or better, for the purpose designed.

The compound is to be mixed usually with a vehicle or body of any suitable nature or form. The present practice is to use a sizing compound, such, for instance, as caseine, that is treated with various reagents, and to which other materials are added, such as starch or glue. This compound is usually mixed with a suitable vehicle such as clay or other earthy material, and then sometimes a solution of wax is added.

The purpose of the present invention is to provide a substitute for the materials that are mixed with this vehicle of clay and wax, or other materials, for producing a sizing compound.

This compound consists essentially of four ingredients, or three of these four ingredients. To these ingredients is also preferably added any suitable preservative material or compound for the purpose of preventing the decomposition of the compound.

The invention, broadly stated, consists of a mixture of, first, a compound or material of a starchy nature, or, preferably, simply starch; second, a solution of moss, of any desired character; third, a gum of suitable character, and the fourth component of the improved compound is a soluble silicate. Instead of employing these four ingredients, either the gum may be omitted and the other three used, or else the moss can be left out and the other three employed.

TREATED LEATHER.

Carl E. Schmidt, of Detroit, Michigan. Patent No. 997,513, dated July 11, 1911.

This invention relates to treated leather, and has for its object an improved article which, as an incident to its preparation, is impregnated with a compound, which, while in no way injuring it either as to finish or lasting qualities, contains a

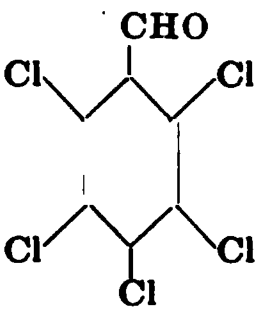
normally latent indicating element, which, when touched with an external body, preferably porous, such as blotting paper, which has been saturated with a chemical reagent to the latent indicating element, causes a change in the color thereof, such as from white to pink, thereby proving that the leather has been treated by a certain process, whose products have attained an enviable reputation for their wearing qualities.

The inventor claims this effect can be obtained by the addition to the usual finishing compounds of phenolphthalein or some such equivalent therefor as methylorange, Congo red, or litmus.

PENTACHLOROBENZALDEHYDE.

Max Weiler, of Elberfeld, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co. Patent No. 998,140, dated July 18, 1911.

The inventor claims that pentachlorobenzalchloride (obtainable either by treating benzyl chloride with chlorine or by treating pentachlorotoluene or pentachlorobenzyl chloride with chlorine) can be converted into the hitherto unknown pentachlorobenzaldehyde



by treating pentachlorobenzalchloride with concentrated or fuming sulphuric acid.

The new process is as follows, the parts being by weight: A mixture of 10 parts of pentachlorobenzalchloride with 50 parts of concentrated sulphuric acid is stirred at about 60–100° C. until the evolution of hydrochloric acid ceases. The aldehyde is obtained in a pure state by pouring the mass of the reaction

on ice. It is a white powder easily soluble in benzene but not so easily soluble in alcohol. It crystallizes in long needles melting at 197–199° C.

MANUFACTURE OF VEHICLES FOR PAINTS AND THE LIKE.

Frank Hornsey Walker, of Bromley, and Charles Emile Sohn, of Harringay, England. Patent No. 999,611, dated August 1, 1911.

The invention consists in the preparation of a vehicle for carrying pigments and the like from oil residuums, crude oils, rosin oil, natural and artificial asphaltic compounds, and waste products in the treatment of hydrocarbon oils.

In carrying the invention into effect, according to one example, in which a mineral oil residuum is used, the mineral oil residuum is treated in the cold with a quantity of sulphuric acid, sufficient to precipitate the asphaltic and resinous constituents contained in it, the treatment being preferably carried out in a mixer provided with rotating and fixed arms to insure intimate mixture. The proportion of the acid used will vary with the character of the residuum dealt with. It will usually be from 5 per cent. to 20 per cent. of the weight of the oil. If solid compounds are dealt with, they are preferably dissolved in hydrocarbon oil before mixing with the acid. The mixture is then if necessary allowed to stand for a considerable time, and two layers will be formed, an upper layer of clarified oil, which may be decanted, and a lower tar-like mass, from which the improved vehicle for pigments and the like is obtained, the clarified oil being suitable for further purification, for use in the arts in which mineral oils are employed. The tarry mass is then subjected to a gentle heat, say 50° C. to 60° C. for a few hours, thereupon bringing about a more perfect combination between the organic matter and the acid. The mass is then returned to a mixer, and again agitated, while water and weak alkali in small quantities at a time is continually added until the desired

quantity has been incorporated. Since excess of a fixed alkali would act destructively upon the combination effecting saponification, the last stage of the neutralization is preferably carried out by means of ammonia.

ART OF PREPARING FATTY-ACID COMPOUNDS.

John William Blagden, of Mannheim, and Richard Müller, of Eilenburg, Germany, assignors to C. F. Boehringer & Soehne. Patent No. 1,000,487, dated August 15, 1911.

This invention relates to fatty compositions to be employed for the manufacture of candles, night-lights, and the like and processes of making the same; and consists in high-melting fatty compositions, viz., ammonia derivatives of acid fatty bodies, and in a process of making such derivatives, comprising the treatment of acid fatty bodies with ammonia, and the subsequent removal of impurities, excess of solvent, fatty acid, etc., and a certain amount of the absorbed ammonia and alteration of such treated bodies by exposure to certain conditions.

MIXED PAINT.

Henry C. Pritchard, of Colfax Township, Mecosta County, Michigan, assignor of one-half to Douglas Roben. Patent No. 1,000,943, dated August 15, 1911.

The object of this invention is to make a paint which will give a hard, lustrous, and durable surface, capable of withstanding the elements longer than other paints in common use; and which will, therefore, form a superior protection to wood, metal, brick, stone, and cement. Its use will also tend to cheapen paints, as it can be manufactured at a less cost than almost any other good paint.

As one of the foundation ingredients the slag, dross, or cinders from iron smelters is used. This is ground to a fine powder. It is silicious in substance, and gives to paint when applied a certain brightness of appearance, and makes it of a hard, flinty nature. The hardness of the powdered slag makes it peculiarly

suitable for use in painting on brick, stone, cement, and metals. It does not "chalk off" as do lead paints.

Body of paint.—Pulverized slag of iron smelting, 267 pounds; white lead or oxide of zinc, 400 pounds.

Liquid portion.—Boiled linseed oil, 50 gallons; rice, 25 pounds; water, 65 gallons; gum shellac, 15 pounds; water, 10 gallons; potash, 2 pounds; rosin, 25 pounds; gasolene, 10 gallons.

PROCESS FOR OBTAINING TEXTILE FIBRES.

Fritz Kreissl and Carl Seibert, of Vienna, Austria-Hungary. Patent No. 1,001,284, dated August 22, 1911.

This process is to be used generally and may also be employed for the obtention of textile fibres from any vegetable material, such as nettle, hops, sunflower, and the like.

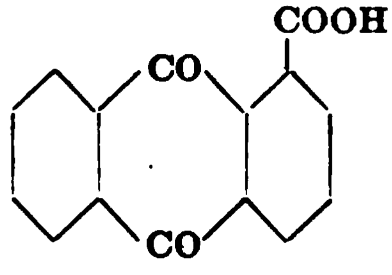
As an example, the process will be described in its application for obtaining nettle fibres. Freshly cut stinging nettles are dried and laid in cold water for twenty-four hours for the purpuse of purifying and softening. After such treatment the stems are boiled in a vessel in an 8 per cent. diluted soda lye when the stems are washed by water under pressure, the stems being brought on a sieve and a strong current of water, preferably warmed, is directed on the stems for the purpose of removing any impurities. The entire stems are then treated in an autoclave boiler with 8 per cent. diluted soda lye for about five minutes at a pressure of preferably fifteen atmospheres. During the following splashing with water, preferably warmed, under pressure the fibres are entirely separated from any remaining woody parts. It is necessary to have the small cellulose fibres caught separately as this material is of greatest importance especially for the manufacture of paper. At the boiling process in the autoclave boiler the vegetable gum is perfectly dissolved and a material is thus obtained which is specially adapted to be used as a sticking material. The obtained vegetable fibres are already in a very pure state. However, it is advisable to have

the obtained fibre material boiled once more in the autoclave boiler with an 8 per cent. soda lye at a pressure of ten atmospheres for three minutes. After a further splashing of the fibres with water, preferably warmed, the fibres may be brought once more in the autoclave boiler and be treated with a 2 per cent. soda lye at a pressure of three atmospheres for three minutes. The fibre material thus obtained is now in a most pure state and is to be splashed with water, preferably cold, once more on a sieve or the like. It is preferable to bleach immediately after the said process of obtaining the fibres and the said bleaching is effected with a solution obtained by an electrolysis of common salt. The bleaching solution is preferably to be used in a strength of 5 to 15 per cent. The fibre material is then left in the bleaching solution until it has reached a brilliant whiteness. After the treatment with this bleaching solution the fibres are brought into water to which is added a kilo of sulphuric acid to each one hundred litres. The fibres are left but a very short time in this very diluted sulphuric acid when they are washed and dried. In order to make the fibres still more flexible and smooth they are treated with vapors of glycerine during a short time.

PRODUCT OF THE ANTHRAQUINONE SERIES AND PROCESS OF MAKING SAME.

Fritz Ullmann, of Charlottenburg, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 1,001,-325, dated August 22, 1911.

This invention relates to new products of the anthraquinone series and the process for the manufacture of the same consists in acting upon an anthraquinone-alpha-carboxylic acid, that is to say, upon



or a derivative of this acid, with a hydrazine, such as, for instance, phenylhydrazine or bromphenylhydrazine, etc.

The claims specify the product from phenylhydrazine. The new product thus obtained forms yellow needles, which are insoluble in water, alcohol, and ether; it melts at 286° C. (uncorrected) and is easily soluble on heating in aniline and pyridine to a yellow solution. In concentrated sulphuric acid the product dissolves to an orange solution having a weak-green fluorescence.

COMPOSITION FOR PRESERVING WOOD, ETC.

Joseph M. Long, of Chicago, Illinois. Patent No. 1,001,657, dated August 29, 1911.

The claims cover:

1. A composition for preserving wood, and so forth, composed of twelve ounces of chloride of sodium, one ounce of calcium sulphate, one ounce of zinc sulphate, three-quarters of an ounce of copper sulphate, one-quarter of an ounce of iron sulphate, and three gallons of water.

2. A composition for preserving wood, and so forth, composed of twelve ounces of chloride of sodium, one ounce of calcium sulphate, one ounce of zinc sulphate, three-quarters of an ounce of copper sulphate, one-quarter of an ounce of iron sulphate, with sufficient water to permit of the proper saturation of the article treated.

4.4′-DIBROM-DIPHENYL-DISULPHIDE-2.2′-DICARBOXYLIC ACID AND PROCESS OF OBTAINING SUCH BODIES.

Eduard Münch, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik. Patent No. 1,003,289, dated September 12, 1911.

The inventor has discovered a new body suitable for the manufacture of coloring matters which is chemically a 4.4′-dibrom-diphenyl-disulphide-2.2′-dicarboxylic acid, and to obtain this a new process which can also be applied by the production of analogous bodies. By reacting with a solution of a sulphanti-

moniate, sulpharsenate, or sulphostannate or an orthodiazobenzoic acid compound, under which term is included orthodiazobenzoic acid itself, or a homologue or an analogue thereof, or a derivative of either of these compounds, the corresponding diphenyl-disulphide-2.2′-dicarboxylic acid compounds are obtained in a pure condition, the yield being almost quantitative. Apparently intermediate compounds containing both sulphur and a diazo group are formed, but these are very unstable and immediately begin to split up, giving rise to the diphenyl-disulphide-2.2′-dicarboxylic acid compounds. For the purpose of this invention a sulpharsenate and a sulphostannate are equivalents of a sulphantimoniate. Upon treating the diphenyl-disulphide-2.2′-dicarboxylic acid compounds thus obtained with a reducing agent, the corresponding phenyl-mercaptan-2-carboxylic acid compounds can be obtained. The new product is colorless, melts at about 310° C., and when freshly precipitated from its solution is easily soluble in acetone and difficultly soluble in alcohol and glacial acetic acid and very difficultly soluble in boiling water.

DIANTHRAQUINONYL-DIALDEHYDES AND PROCESS OF MAKING THEM.

Max Henry Isler, of Mannheim, Germany, assignor to Badische Anilin & Soda Fabrik, of Ludwigshafen-on-the-Rhine, Germany, a corporation. Patent No. 1,004,433, dated September 26, 1911.

The inventor has found that by treating 1-halogen-anthraquinone-2-aldehyde, or a derivative thereof, with a substance which is capable of splitting off halogen, such, for instance, as copper, and preferably while employing a diluent, such as naphthalene or nitrobenzene, and a substance with an alkaline reaction, such as sodium carbonate and potash, new condensation products can be obtained which are formed by the removal of the halogen from the molecule, whereupon two residues combine together. Thus, from a 1-halogen-anthraquinone-2-aldehyde

itself a compound is obtained which, according to analysis, appears to be 1.1′-dianthraquinonyl-2.2′-dialdehyde.

ALUMINOUS COMPOSITION.

Edwin Taylor, of Brooklyn, New York, assignor to Union Clay Products Company. Patent No. 1,004,934, dated October 3, 1911.

The basis of this composition is clay, and preferably that character of clay found in some portions of Long Island and elsewhere which has a content of sulphur in the form of free sulphur or some metallic sulphide such as sulphide of iron. In any event, whether the sulphur is a natural content, or whether the same is added to the clay, it must be in a condition to combine with oil to vulcanize the latter.

For some purposes an effective composition is secured by a mixture of the clay and vulcanized oil, but the mixtures in some proportions are not valuable for certain purposes in consequence of the tendency of the composition to harden and become brittle at reduced temperatures, and in order to obviate this objection combine with the aforesaid composition an additional proportion of oil which has been nitrated. By the addition of nitrated oil to the aforesaid composition it is found that it is rendered more plastic and has greater flexibility, and that it is not affected by a reduction of temperature so that it will retain its plasticity at low temperatures where otherwise it would harden and be unsuitable for some purposes.

COMPOUND FOR TREATING FABRICS.

Seymour M. Hermann, of New York, N. Y. Patent No. 1,008,-332, dated November 14, 1911.

In carrying out the process the fabric is first immersed in a bath of a solution of soap of any suitable or desired nature. This bath produces an improved effect if about one part in five of silicate of soda is added, and also a small quantity of any suitable oil such as olive oil, but the soap alone may be used

and these two compounds are not by any means necessary. This bath is brought to a temperature of about 120° F. and the textile or fabric is immersed in this bath until fully impregnated; the action is facilitated by agitating the bath. The next step in the process is to add to the bath about 10 per cent. of a compound consisting substantially of the following: 50 parts of 22 to 70 per cent. solution of lactic acid, 20 parts of 10 to 50 per cent. solution of tartaric acid, 2 parts of 28 to 99 per cent. solution of acetic acid, 5 parts of 10 to 45 per cent. solution of phosphoric acid, 1 part of 5 to 22 per cent. solution of hydrochloric acid, 5 parts of 15 to 25 per cent. solution of salicylic acid, 6 parts of 15 to 25 per cent. solution of gallic acid, 5 parts of amyl acetate, 5 parts of oil of mirbane. This compound is mixed with water. This compound is added to the aforesaid bath of soap, either soap alone, or soap mixed with the oil and silicate of soda as described, about one part to nine of the bath, and this mixture is stirred until the fatty acids have been separated. The fabric is allowed to remain in this bath for a suitable length of time, such as about fifteen minutes, after which the fabric is lifted and treated in a hydro-extractor, and thereupon fully dried. It is found that very similar results are obtained if the acetic acid, the phosphoric acid, and the hydrochloric acids are omitted from the above-described compound, using only the other six materials mentioned. After such treatment the fabric or textile will be found to have a scroop or crunch, and also to have a high finish and lustre. This treatment also imparts a semi-softness to the material. This treatment as above set forth has an effect on the goods that is termed as fast, and such effect on the goods is what is termed in the trade as a condition that will not fly.

METHOD OF MAKING PAINTS.

Alexander S. Ramage, of Buffalo, New York. Patent No. 1,008,434, dated November 14, 1911.

According to the preferred mode of practising the invention the pigment, suspended in or mixed with water, is intimately

mixed with a suitable soap, usually a stearate or oleate soap or a mixture of these, the soap being previously dissolved in water. A suitable proportion of soap is from 5 to 30 per cent. by weight of the pigment, but this proportion may be varied according to the character and uses of the paint. For example, for a flat paint to be mixed with turpentine or rosin spirit and to be used without oil, a comparatively large proportion of soap may be used, say from 20 to 30 per cent.; on the other hand, for the purpose of combining with oil, the smaller proportions of soap are preferred. If the pigment does not contain any basic lead compound, the dissolved excess of the soap is precipitated by means of a solution of lead acetate or nitrate, or other suitable salt yielding an insoluble metallic soap. The pigment is then run off, or filter-pressed, and the wet color is charged into a paint-chaser, putty-mixer or equivalent device, and the paint vehicle or oil added. In a few minutes the pigment combines with the oil, and the water separates and is run off. The resulting oil paste can be thinned in the usual way with any desired paint vehicle, and is ready for use. The effect of the foregoing treatment is to combine with the pigment a certain proportion of a substance such as stearate or oleate of lead which has a water-repellent character and at the same time an affinity for oil whereby the replacement of the water by the oil is greatly facilitated. Lead pigments thus prepared can be mixed with rosin varnish without livering.

TREATMENT OF CELLULOSE.

Henry Peters, of London, England, assignor of one-half to Horace Wayth Cullum. Patent No. 1,008,489, dated November 14, 1911.

This invention relates to the treatment of cellulose whereby the same can be brought into a form particularly adapted for the preparation of solutions capable of application for the manufacture of films, threads, coatings, moulded articles, and the like.

According to the invention the cellulose is heated for some

time with petroleum oil or any other oil, including in this designation glycerine, and after cooling the mass of cellulose and removing the adherent oil therefrom it is treated with a solution containing formic acid and palmitic acid together with a solvent such as methylated spirit, then subjected to the action of an acetylizing bath which may consist in substance of sulphuric acid, sodium acetate, acetic anhydride, and a condensing agent. The resulting cellulose product may then be treated with a neutralizing solution, preferably a solution of ammonium carbonate in a volatile solvent such as methylated spirit, and the product may be finally washed with water containing ammonium carbonate or other neutralizing agent and finally washed with water and dried.

CELLULOSE COMPOUND.

William H. Walker, of Newton, Massachusetts. Patent No. 1,009,116, dated November 21, 1911.

This invention relates to improvements in organic cellulose esters, as, for example, the cellulose esters of the fatty acids, such as cellulose acetate, and particularly to the dissolving or gelatinizing of these esters by methods involving the use of new solvents. The halogen substitution products of ethane and especially symmetrical tetrachlorethane or acetylenetetrachloride are solvents for these esters and well adapted for dissolving or gelatinizing cellulose acetate. Acetylene tetrachloride, for example, is a more powerful solvent for cellulose acetate than chloroform and its volatility is relatively low. But in order to obtain the advantages offered by the use of the halogen substitution products of ethane, and especially acetylene tetrachloride, as solvents for cellulose acetate and at the same time produce a more satisfactory solution, inasmuch as it will film more quickly, a liquid alcoholic ingredient, or ingredients, is added, which is soluble or miscible therein, which alone is a non-solvent for the cellulose acetate. For example, wood alcohol, when admixed with acetylene tetrachloride in proper proportions, will not destroy

the specific solvent action of the latter upon cellulose acetate, but gives the added advantage of causing the solution to film more quickly than if acetylene tetrachloride alone is used. The addition of wood alcohol, in suitable proportions, to acetylene tetrachloride produces a mixture which is an especially powerful and useful solvent for cellulose acetate in spite of the fact that the wood alcohol alone is not a solvent; in fact, the combination of wood alcohol and acetylene tetrachloride makes a more powerful solvent of cellulose acetate than acetylene tetrachloride alone. Thus, for example, by dissolving one part of cellulose acetate in ten to twelve parts by weight of acetylene tetrachloride containing one part wood alcohol, a mixture or solution eminently suitable for varnish or lacquer is obtained which flows easily and leaves upon evaporation, in thin layers, a smooth, transparent film or coat.

OIL AND PIGMENT.

Erik W. Enequist, of Brooklyn, New York. Patent No. 1,009,708, dated November 21, 1911.

In carrying out this invention dissolve about an equal quantity of petroleum or wax tailings, while preferably in a melted condition as obtained from the still, or melted by reheating if it has been allowed to cool, in about the same quantity of a light hydrocarbon oil, such, for instance, as benzine or turpentine substitutes at about 64–60° Bé. or 48–60° Bé. respectively, or in a mixture of the two having a gravity varying from 64–48° Bé., or in a solvent having a boiling point of 150° to 300° F. The solution is then allowed to cool, or is artificially chilled, and settle, and when thoroughly settled a green phenol precipitate forms of the formula $C_{18}H_{18}O$. This green color or pigment is then treated with fresh hydrocarbon liquid and so washed out and purified, and when dried forms a green color or pigment for paint. The solution in which this green phenol precipitate forms, after settling for a certain period of time, usually several weeks, forms a clear oil or pigment carrier after

it is separated from the precipitate, it having the color of boiled dark linseed oil, and has the quality of binding ordinary pigments, and by the addition of a suitable drier it will, together with such pigments as may be mixed therewith, dry hard upon the evaporation of the light hydrocarbon oil therein. This improved oil or pigment carrier, when dry, or even before it is dry, will withstand the action of alkalis, ammonia, dilute acids, water, and atmospheric conditions, and, therefore, forms an exceedingly good waterproofing material, it being very much less expensive to produce than linseed oil, costing about one-sixth of the cost of linseed oil.

SUBMARINE PAINT.

Henri Terrisse, of Vernier, near Geneva, Switzerland, assignor to Fabrique de Vernis et Produits Chimiques Société Anonyme. Patent No. 1,012,177, dated December 19, 1911.

The composition which forms the object of the present invention differs essentially from all those which are actually in use by the poison which it contains and which is formed by an amalgam of mercury or an alloy suitable to form in presence of sea-water a voltaic element which can produce toxical bodies by decomposing the said sea-water. One can use, for instance, an amalgam containing 20 parts of copper and 4 parts of mercury, to which a pigment and a waterproof varnish are added. The proportions of the amalgam may, moreover, vary. This composition so obtained is extremely stable and forms a very powerful toxical composition of rapid ionization for the follow-reasons: As soon as the spores of Algæ or the mollusks attach to the paint, they attack and disintegrate the protective coat of varnish and make bare the particles of amalgam; immediately, a voltaic element producing an electric current is formed which decomposes the ambient sea-water by forming cuprous chloride and corrosive sublimate (mercuric chloride). Cuprous chloride is always formed owing to the excess of copper of the amalgam. The cuprous chloride and the sublimate form together a double

salt of a very great toxical power, especially at the nascent state. At the same time, the adjacent particles which have not been made bare remain inactive until new spores or mollusks arrive. At equal quantities of poison this paint will always be more toxical than the paints known until now, owing to the fact that in the salts and oxides the quantity of metal is inferior to the unity, while in the present case, at the moment when the paint becomes active the poison which forms in it will be superior to the unity. The composition represents a composition for bottoms of ships having, so to say, an automatical action.

PART IV

Notes on Processes, New Colors, etc.

Notes on Processes, New Colors, etc.

LONDON SHRINKING.

Stamped in bold letters upon the end of a piece of cloth, the sentence, "thoroughly London shrunk," carries a guarantee that the fabric so marked has been shrunk as far as it will go. The legend also bears the name of the firm of shrinkers who are responsible for the work. London shrinking is a trade quite distinct from ordinary finishing, and, as a general rule, those who follow it confine themselves to shrinking only, although any one with the necessary plant can work the process.

In many cases the cloth, after finishing out, is sent by the owner to be London shrunk, and this, of course, entails a certain amount of refinishing by the shrinkers. By sending the fabric to another firm to shrink after finishing, the owners are then assured that the most thorough treatment has been given and that the material has shrunk to its utmost limits. When a finisher takes in a number of pieces, he is held responsible for whatever defects they exhibit after passing through his hands, unless the faults are obviously in the raw material or in spinning and weaving; and shrinking, when properly done, shows up many faults which were covered by the previous finish. On this account, shrinking is rarely done so thoroughly by ordinary finishers as it is by those who make shrinking a specialty, for, while the finisher is concerned about faults developing, the professional shrinker cares nothing about these, his business being to get the cloth up all it will go.

Without doubt the methods used by London shrinkers are the

most drastic known, and after ordinary shrinking it is nearly always possible to get a little more by putting the goods through the London process. Once properly shrunk the weather has no further action in causing them to run-up, but it will be obvious that many low, thin cloths will not stand it owing to lack of backbone. As a case in point, take a lightweight, cross-bred worsted. If this is shrunk, it loses all character and becomes exactly like an old dishcloth; but a cloth made from better stuff, such as merino, will shrink up and look none the worse.

At times, finishers receive instructions to shrink the goods, but are also given the width and length the cloth is wanted. Under these conditions, perfect shrinking is impossible as the width requirements make it an absurdity. It is not an uncommon thing to hear of pieces being sent to retenter half an inch wider after going through the shrinker's hands, this, of course, simply undoing all the shrinker's work, as a tentered piece cannot by any stretch of imagination be called shrunk.

Different firms have various modifications of their own, but the following system is in general use and will be found to give the maximum of shrinkage. Assuming the cloth to have come in the finished state from the warehouse, the first operation is to open it out into full width, ready for the wetting-out machine. Here the fabric passes an open width through the water-trough and under two submerged rollers. From here it is drawn between heavy squeezing-rollers and up and over a guide-roller from which it travels over a drawing-roller and is folded down. The two squeezing-rollers are pressed together by a hand-wheel and spring at each end and may be covered with a few yards of fine cotton to form a bed, or one roller may be clothed with rubber and its fellow of metal. The nip, however, between, the two must be close enough to impregnate the cloth with water thoroughly, and yet not leave it wringing wet. After wetting-out, the fabric is taken to steam drying cans, and here the actual shrinking takes place.

As the fabric goes on to the steam-heated cans, it must be quite free from any tension or brake action. To guard against this, all the cans are geared one to another so that the cloth passes around them without the slightest strain. Some drying machines have one or more drawing cylinders, while the rest are left free, the travelling fabric rotating those which are free from gearing, but this style of dryer is of no use for shrinking purposes, as the tension in turning the loose cans pulls the cloth out in length. Coming onto the surface of a hot cylinder, with the material in a thoroughly saturated condition, gives it every chance of creeping up, particularly as there is no tension whatever on the cloth, either in width or length, and the softened fibres are at liberty to assume a natural position. From a scientific standpoint, shrinking is equivalent to balancing a number of strains, all of which are pulling in various directions, and by allowing these the best conditions to adjust themselves, it constitutes the entire process of shrinking.

Heavy milled fabrics, such as box cloths, army goods, meltons, and vicunas are practically shrunk as much as they will go after milling, providing, however, that tentering does not pull them out. For practical purposes, it is found necessary to pull out the width during tentering, in order to straighten out creases, etc., which would interfere with the other operations of finishing. But as a general rule the process of pressing followed by steaming allows the cloth to regain its normal width in a gradual, easy manner. Spun threads of either vegetable or animal origin increase in thickness when subjected to moisture and heat, that is, each individual fibre contracts in length, increases in diametre, and takes on more or less of a curl. Wool fibres show this elasticity in a much higher degree than either silk or the vegetable fibres, their complicated structure partially accounting for this, in addition to their varied constituents.

Probably the best illustration of a wool fibre is seen in a ram's horn. In this, both shape and composition are the same, the serrations are plain and the curl is evident by the increased

cell growth at one side pushing it over into a curved form. In a similar manner to woolen fabrics, horn may be softened by heat and moisture and will, if dried, retain whatever form is given to it while in the plastic state, thus imitating exactly the behavior of a woolen cloth dried under tension. An arrangement is possible by means of which the fabric may be fed continuously through the wetting-out trough straightway onto the steam cans. In this, the material follows the direction of the arrow, instead of travelling overhead to the cuttling frame, providing the cloth is perfectly saturated. This method is more economical than piling the cloth down before drying, but the latter method is best with very heavy cloths, as it ensures thorough impregnation.

By assisting the wool fibres to get back to their normal position, shrinking frequently shows up defects which were quite invisible prior to this operation. An example is seen in crimps, caused by running in rope form too long a period. In this case, a weakness of fibre is formed along the lines of the crease, the cloth losing its power of springing straight. If tentered, however, under considerable tension, the creases are pulled out and remain so when dried in this condition. On coming to be shrunk such a cloth would reveal the old faults. The cross-tension being removed all the strains would balance themselves and the creased portion having less elasticity would again show the fault. Precisely the same occurs with fabrics having cockled places or different bobbins of weft which show as a series of depressions across the cloth. When not too severe, these may be covered by pulling well out in width during tentering, following this up by leaving plenty of press-finish on, which keeps a straight surface and imparts slip to the hand. After shrinking all cloths require pressing-up again and for this nothing but the old style of pressing between papers will do. Rotary presses, by reason of the friction upon the bed, pull out the fabric in length and thus upset the balance of strains equalized by the shrinking.

while the finish imparted is more approaching frictional polish than press condition. London-shrunk cloths are usually finished with very little lustre on. This may be done by pressing cold, but if the extra condition is wanted there is no reason why this should not be given without detriment to the shrinking.

Besides the system just dealt with, there are other methods of shrinking fabrics, the oldest consisting in winding two pieces of cloth onto a roll, one being dry and the other wet. On leaving them in this state for some hours, say, for the space of a night, the dry one will be found to have absorbed considerable moisture from the other as well as having shrunk in length and width. The winding-on must not be too tight, or it will defeat its own object, as the fabric then will be too hard to allow the fibres to shrink. Another plan was to run the cloth over a steaming mill for, say, twenty minutes, blowing steam into it all the time, then to take it off, give a good damping, and allow it to lay in the cuttled state some hours before pressing up. Yet another way was by wetting-out the fabric and hanging up over wooden spars in a fairly dry room. This gave a gradual natural shrinkage, but, unfortunately, left the cloth rather baggy and irregular, which rendered further work on it more difficult. The drying range, which is often regarded as belonging to the cotton finisher, gives very good shrinking results, and is a most useful adjunct to a woolen finisher's plant.—*Dyer and Calico Printer.*

BRILLIANT PATENT BLUE A.

This is a new member of the Patent Blue group and differs from the older members by its greater brilliancy of shades. It is very soluble, dyes level in an acid bath, and the resulting shades are fast to alkali, washing, and water. It can also be dyed on a chrome mordant, or after-treated with bichromate by which methods the shades are of good fastness to milling. It

can be used for all classes of woolen and worsted material where great brilliancy of shade is of interest. In combination with Acid Violet 5BF it will be found useful in the production of navy blues on shoddy and can be used for shading afterchrome colors. It is suitable for use in any form of dyeing machine. Interwoven white cotton is not stained, while silk is dyed nearly as deep as the wool.

PATENT BLUE A NEW.
PATENT BLUE V NEW.

These two new dyestuffs of the Patent Blue group are similar to the former brands Patent Blue A and Patent Blue V, but are notable on account of their greater purity and better solubility. The Patent Blue A new is less liable to crock and does not stain cotton. The characteristics of general fastness and other properties are the same as the older marks.

HELINDONE BLUE 3G PAT. POWDER.

This product which is similar in shade and characteristics to the Helindone Blue 3GW for cotton, is especially suitable for wool and silk-dyeing. It gives bright greenish-blue shades, and in combination with Helindone Yellow 3G, bright greens, which are more brilliant than those obtained with other blues. The fastness in all respects is very satisfactory.

DYEING DIRECTIONS.

PREPARATION OF STOCK LIQUOR.

10	lbs. Helindone Blue 3G Powder
2¼	lbs. Caustic Soda Solution 40° Bé.
1	lb. Helindoil
1	lb. Hydrosulphite MLB conc. powder
4	gallons water at 120° to 140° F.

Mix together and allow to stand for 20 minutes at 140° F. When the reduction is complete the solution is yellow-brown, changing rapidly to blue in the air.

DYE BATH.

For dyeing 60 to 80 lbs of wool, a kettle containing 750 gallons is prepared as follows: Heat to 150° F., and add in the order given:

3 lbs. Glue, previously dissolved
3 lbs. Soda Ash
3 lbs. Helindoil
10 to 15 oz. Hydrosulphite MLB conc. powder.

After stirring, a sample of the liquor should give a positive reaction with phenolphthalein. The required amount of stock liquor is then added. The wool entered wet or dry and worked for 20 to 30 minutes at 150°: at temperatures above this, the shades will be duller. The wool is then squeezed out, smothered for 1 to 2 hours, when the oxidation should be complete. The stock is then rinsed and soured with 3 lbs. of oil of vitriol or 5 lbs. acetic acid at the boil for 20 to 30 minutes. The shades will then resist all subsequent processes.

In standing baths only 65 per cent. of the original amount of dyestuff is required.

HELINDONE BROWN CR.

This new product is of particular interest for wool dyeing, and, although the shade is the same as the G brand, its strength is greater. The fastness is very good in both light and dark shades. It stands washing, milling, carbonizing, light, and wearing.

DYEING DIRECTIONS.

PREPARATION OF STOCK LIQUOR.

10 lbs. Helindone Brown CR Paste
3 lbs. Caustic Soda Solution 40° Bé.
1 lb. Helindoil

4 gallons Hot Water
1 lb. Hydrosulphite MLB conc. powder.

Mix together and warm to 160° F., and keep at this temperature five to ten minutes. The properly reduced liquor should be of a brownish color, turning full yellow-brown on exposure. The stock liquor should be used at once.

DYE BATH.

A kettle containing 750 gallons of water is prepared by heating to 160° F., and adding:

3 lbs. Glue freshly dissolved
3 lbs. Sodium Carbonate
3 lbs. Helindoil
10 to 15 oz. Hydrosulphite MLB conc. powder.

After stirring well, the liquor should give a positive red reaction with phenolphthalein test solution. The required stock liquor is then added. The material either wet or dry as convenient is entered and worked for twenty to thirty minutes, the temperature being 160° during the operation. The stock is well squeezed and smothered for one to two hours. It is then rinsed and soured with four pounds oil of vitriol at 170° F. for one-half hour, then rinsed again and dried.

In using old baths only 65 per cent. of the original quantity of dyestuff is required.

HELINDONE GRAY BR.

This vat color is especially suitable in wool dyeing for the production of gray shades of excellent fastness. They are fast to light, alkali, milling, potting, and decatizing.

It can be used in combination with other helindones.

DYEING DIRECTIONS.

PREPARATION OF STOCK LIQUOR.

10 lbs. Helindone Gray BR paste
4 lbs. Caustic Soda Solution 40° Bé.
2 lbs. Helindoil
2 lbs. Hydrosulphite MLB conc. powder
2 lbs. Glue, previously dissolved
12 gallons Water.

Mix together, warm to 150° F., and keep at this temperature for one-half hour; when the reduction is complete the solution is dirty yellowish-green. The stock liquor should be used immediately.

DYE BATH.

A kettle of 750 gallons of water is heated to 160° F., and prepared by the addition of

10 oz. Hydrosulphite MLB conc. powder
3 lbs. Glue, previously dissolved
2 lbs. Soda Ash
2 lbs. Helindoil.

The required amount of stock liquor is then added and the material handled the same as with Indigo MLB.

HELINDONE YELLOW CG.

This is a new Helindone color which gives shades resembling Fustic, Alizarine Yellow, etc. The fastness of this dyestuff in both light and dark shades is excellent. It is considerably faster to light, carbonizing, and wearing than any other wool yellow. It is not affected by the various processes of manufacture. It can be continued with all other vat colors suitable for wood dyeing.

As Helindone Yellow CG can be used either with Indigo MLB or other Helindones, it is necessary to follow the method required for the other dyestuffs.

DYEING DIRECTIONS.

METHOD I.

When used alone or in combination with Indigo MLB, Helindone Gray BB, the stock liquor is prepared as follows:

10 lbs. Helindone Yellow CG paste
1½ lbs. Caustic Soda Solution 40° Bé.
4 gallons Boiling Water
1½ lbs. Hydrosulphite MLB conc. powder

are mixed together and the temperature raised to 150° to 160° F. by the further addition of boiling water if necessary, and kept at this point for twenty to thirty minutes. The color of the solution should be pale brownish-yellow turning deep yellow on exposure to the air.

DYE BATH.

Seven hundred and fifty gallons of water is prepared by the addition of

3 lbs. Glue previously dissolved
3 lbs. Ammonia
10 to 15 oz. Hydrosulphite MLB conc. powder.

The liquor should show a faint alkaline reaction with phenolphthalein. The required amount of stock liquor is added and the wool entered. It may be wet or dry. It is worked for thirty minutes, squeezed out, and smothered for two hours until the oxidation is complete. No further after-treatment is necessary, the stock then being washed in cold water and dried.

METHOD II.

When used in combination with Helindone Brown CR, G, Orange R, Red 3B, etc., the stock liquor is prepared as follows:

10 lbs. Helindone Yellow CG Paste
3 lbs. Caustic Soda Solution 40° Bé.

1 lb. Helindoil
4 gallons Hot Water
1¼ lbs. Hydrosulphite MLB conc., powder.

Mix together and keep at a temperature of 160° F. until the reduction is complete. This requires about twenty minutes.

DYE BATH.

For dyeing sixty to eighty pounds wool, a kettle containing 750 gallons of water is prepared. It is then heated to 160° F., and the following added:

3 lbs. Glue
3 lbs. Soda Ash
3 lbs. Helindoil
10 to 15 oz. Hydrosulphite MLB conc. powder.

After stirring, the liquor should show a positive red reaction with phenolphthalein solution. The required amount of stock liquor is then added. The stock may be dry or wet out as convenient. It is worked for thirty minutes, then squeezed out and oxidized for one to two hours. The wool is treated as required for the other colors of the combination, rinsed in cold water, and dried.

Helindone Yellow CG has great affinity for the wool fibre and the baths are practically exhausted.

WOOL DISCHARGE BLACK T.

This is a level-dyeing acid color which can be discharged pure white with Hydrosulphite NF conc. These discharges remain clear and do not darken on exposure. The fastness is sufficient for all classes of light woolen material.

DYEING DIRECTIONS.

The chlorinated woolen material is dyed with four pounds Wool Discharge Black T and an addition of twenty pounds

crystallized Glauber's salt and three pounds acetic acid. The goods are entered at 122° F., the temperature raised to the boil, and after boiling for one-half hour, two pounds sulphuric acid is added and the boiling continued for a further one-half hour, until the bath is exhausted.

PRINTING DIRECTIONS.

As a thickening for the White Discharge, a mixture of wheat starch with soluble starch is suitable and as covering agents, blanc fixe and zinc white with albumen solution. The zinc white must be finely ground and free from lead and iron, as the formation of metallic sulphides will cause the discharged places to become darker. An addition of Ultramarine may be used for bluing the white. The discharge white printing color is finely ground and passed through a sieve before use.

DISCHARGE WHITE.

30 parts Wheat Starch
30 parts Soluble Starch
340 parts Water

Boil well and add when still hot

100 parts Hydrosulphite NF conc.

When dissolved, cool down and stir into the mixture of

100 Blanc Fixe paste 50 per cent.
87 parts Water
200 parts Zinc White, free from Lead
100 parts Albumen solution 1: 1
3 parts Ultramarine
10 parts Turpentine.

———

1000 parts

After printing, the material is slightly dried, steamed for four to five minutes in the Mather-Platt free from air at 212–214° F. and afterwards washed.

To clear the white, it is advisable after steaming to pass the material at full width for about one minute through hot water, and then finish by washing in cold water.

DIANIL CHROME BLUE B.

This is a direct cotton color which yields shades of good fastness to washing and acid. It can be after-treated with bichromate of potash and copper sulphate with acetic acid which increases the fastness considerably but the shades become somewhat duller. Dianil Chrome Blue B is very soluble and can therefore be used in machine dyeing. In unions, cotton is dyed darker than the silk or wool, it will therefore be found useful for this class of work.

DIANIL FAST BLUE GL.

This is a new Dianil Blue which gives shades of more than average fastness to light. It is suitable for all kinds of cotton dyeing and gives pure whites with hydrosulphite discharges. It is also suitable for dyeing silk, half-silk, and artificial silk.

DYEING DIRECTIONS.

Dianil Fast Blue is dyed in the usual way with salt or Glauber's salt and a small quantity of soda at the boil for one hour. The material is then washed, dried, and finished as desired. In discharging the following formula is advised:

WHITE DISCHARGE.

350 parts Wheat Starch Tragacanth Thickening
200 parts Zinc White 1 to 1
200 parts Hydrosulphite NF conc. 1 to 1
250 parts Water.

After printing, the goods are steamed for three minutes in the Mather-Platt free from air at 215° F., washed, and soaped.

DIANIL FAST GREEN B.

This new Dianil color yields shades of good fastness to washing without after-treatment. The shades are also fast to acids, hot pressing, and do not crock. It is not affected by metals.

DYEING DIRECTIONS.

Dianil Fast Green B is dyed with the addition of ten to twenty-five pounds common salt, or an equivalent amount of Glauber's salt and one to two pounds soda ash to the dye bath. The material is boiled for one hour and handled as usual. Without the addition of soda the shades are bluer.

DIAZANIL BLUE BB.

This new member of the Diazanil group yields on cotton when diazotized and developed bright blue shades of very good fastness to light and washing. They are also fast to boiling acid and can, therefore, be used for colored cotton effects in woolen and worsted goods.

The shades can be discharged white with hydrosulphites.

DYEING DIRECTIONS.

Diazonil Blue BB is dyed with salt and a small quantity of soda at the boil for one hour. According to shade one to two pounds of soda and five to twenty pounds salt are required. After dyeing and washing the goods are diazotized with

1½ to 3 lbs. Sodium Nitrite
4 to 8 lbs. Hydrochloric Acid
Worked for one-half hour and rinsed.

The shade is finally developed with

½ to 1 lb. Beta-Naphthol, dissolved in
1 to 2 lbs. Caustic Soda Solution 22° Bé.

The material is worked for twenty minutes in this bath cold and then washed.

METHYLENE HELIOTROPE OL.

This product is similar in shade and equal in fastness to the older Methylene Heliotrope O, but is now soluble. It can be used for tannin discharge styles, either alone or in combination on alkali discharged tannin grounds.

Methylene Heliotrope OL is dissolved in pure water with an addition of a little acetic or formic acid. It is not completely soluble in water alone, especially if the water is hard. The product is suitable for direct printing and discharge styles.

A. DIRECT PRINTING.

Printing Color.	*Dark.*	*Light.*
Methylene Heliotrope OL	20 parts	5 parts
Acetic Acid 6° Bé	80 parts	30 parts
Acetine	30 parts	10 parts
Water	188 parts	193 parts
Glycerine	30 parts	20 parts
Thickening St. T	550 parts	——
Senegal Gum 1: 1	——	700 parts
Tartaric Acid crystals	2 parts	2 parts
Acetic Acid Tannin Solution (1: 1)	100 parts	40 parts
	1,000 parts each	

THICKENING ST. T.

Wheat Starch	120 parts
Water	600 parts
Tragacanth (60: 1000)	180 parts
Acetic Acid 60° Bé	100 parts
	1000 parts

Boil, then cool down.

After printing, the material is steamed for one hour without pressure, passed through tartar emetic, washed, and soaped.

B. TANNIN-DISCHARGE STYLE.

On account of its good fastness to soap and light, Methylene Heliotrope OL is well suited for the tannin-discharge styles both alone and in combination with the other fast basic dyes.

Methylene Heliotrope OL combined with Thionine Blue GOO gives brilliant fast navy-blue shades.

The color is dissolved with the double amount of acetic acid and added to the dye bath which has been prepared with 3 per cent. alum and perhaps a slight amount of tartar emetic.

Hard water must be corrected with up to one part acetic acid 90° Tw. per 1000. No more than 0.1 to 0.2 parts tartar emetic can be added per 1000 dye liquid as a larger addition would cause a loss of dyestuff by precipitation. As a matter of fact, the addition of tartar emetic may generally be dispensed with.

The bleached material is padded at 100–120° F. on the three-roller padding machine with the tannin solution which contains 20 parts ammonium chloride and 5 parts formic acid and dried in the hot flue. The goods are then printed with the Discharge White, well dried and steamed for 2–3 minutes in the Mather-Platt at 212–215° F. Then the goods are passed through a tartar emetic bath at 140° F. (5 to 15 parts tartar emetic per 1000) well washed and soaped at full width, then washed and dyed.

The dye bath should be made up to fifty times the weight of the material. The goods are entered into the cold dye bath, worked for one-half hour, then the temperature is raised to the boil and boiling continued for one-quarter to one-half hour, until the bath is exhausted and the white sufficiently clear. Then the material is thoroughly washed, dried, and chemicked on the drum if necessary or soaped.

DISCHARGE WHITE.

100	parts British Gum Powder
650	parts Soda Lye 40° Bé.
	heat, cool, and add
245	parts Sodium Bisulphite 36° Bé.
5	parts Alizarine Brown Paste
1000	parts.

THIOGENE DEEP BLUE RL CONC.
THIOGENE DEEP BLUE 2RL CONC.

These products are similar in characteristic to the former Thiogene Deep Blues but the shades are more red in cast.

They dye level and being easily soluble are suitable for machine dyeing.

DYEING DIRECTIONS: The dyestuff is mixed with the required amount of alkali, hot water is added and then sodium sulphide crystals, equal to the weight of the dyestuff. The whole is boiled until the solution is complete and then added to the dye bath which contains the salt.

The material is boiled for one hour, then squeezed or wrung out, rinsed, and dried.

THIOGENE YELLOW GH, GH CONC.

These are sulphur yellows which, without after-treatment, give clear yellow shades of good fastness to washing, light, acid, chlorine, and stand hot ironing. They are very soluble, dye level, and can, therefore, be used in dyeing machines. The GH conc. is twice as strong as the GH.

DYEING DIRECTIONS: The dyestuff is dissolved with an equal amount of sodium sulphide crystals in boiling water. The solution is added to the dye bath which has been prepared with soda and common salt or Glauber's salt, the temperature of the bath

is raised to the boil and the dyeing operation carried out for one hour near boiling point. The material is then thoroughly rinsed, and for the complete development of the shade two to five pounds acetic acid or one-half to two pounds formic acid are added to the final rinsing bath. For light shades, one part Turkey-red oil per 1000 dye bath is added instead of common salt.

When dyeing in standing baths, about eight-tenths of the original amount of dyestuff is sufficient. The proportion of sodium sulphide to dyestuff must be the same as in the first bath. Three pounds soda will be sufficient for the standing bath and about five pounds common salt. The additions are shown in the following table:

	First Bath.	*Standing Bath.*
Dyestuff	10 lbs.	8 lbs.
Sodium Sulphide Crystals	13 lbs.	8 lbs.
Sodium Carbonate dry	5 lbs.	3 lbs.
Common Salt	40 lbs.	5 lbs.

RESISTS ON COTTON YARN.

The yarn is laid down for several hours, or over night, in a solution of cerium chloride 25° Bé., with 20 parts acetate of soda per 1000 added. The yarn is then wrung out and dried at a temperature not exceeding 120° F. The dried yarn is now passed quickly through a solution containing per 1000 parts

200 parts Caustic Soda Solution 40° Bé.
100 parts Sodium Hypochlorite 10° Bé.

This must take not more than two minutes, as it is liable to attack the yarn. It is then thoroughly washed immediately.

The goods containing the prepared yarn are dyed with the Y marks of Dianil colors in the usual way. If any development is necessary it is done after the cerium preparation is removed.

The ceric oxide precipitate is removed by passing through a cold acid bath containing 50 to 100 parts conc. hydrochloric acid per 1000. This requires about five minutes' time. If the effects are not clear a further treatment with 2 per cent. bisulphite is given. The material is finally well washed.

DYEING DIRECTIONS FOR VAT COLORS WHEN USED IN CIRCULATING MACHINES ON LOOSE COTTON.

The stock liquor is prepared the same way as if the color was going to be used on warps and then the dye bath is prepared as follows:

The machine is loaded with the material to be dyed and filled up with water, heated to 100° or 105° F. Circulate for ten minutes to be sure that the temperature is even throughout, then add two pounds caustic soda dry, and three pounds hydrosulphite MLB powder conc. Circulate for ten minutes, then add the stock liquor gradually, that is, in about ten minutes. Let dye liquor circulate for forty minutes after the stock liquid has been fed in. If the dye bath has to be kept, pump it back to the reservoir tank and let the stock lie in the machine for ten to fifteen minutes before oxidizing it.

To oxidize the color on the fibre, give a short rinse with cold water in order to remove the caustic which is left in the stock, then shut off the running water and circulate a solution made up of three pounds acetic acid and one and one-half pounds chrome. Heat up to 100° F. to facilitate oxidation; circulate for about fifteen to twenty minutes, then rinse thoroughly with cold water. To get a brighter color, it is necessary then to give a good soaping at 170° to 180° F. with three pounds of chipped soap and one and one-half pounds soda ash. Pump soap solution for about twenty mintes, rinse again with cold water, and remove stock from machine.

HELINDONE YELLOW CG.

This new Helindone can be used for cotton printing by various methods. The best results in direct printing are obtained by using a strongly alakaline paste and Hydrosulphite NF conc. The requirements are the same as for Indigo printing in combination with which it may be used.

Helindone Yellow CG cannot be discharged with Hydrosulphite CL or NF conc. and Discharge Base, but it may be padded over zinc chloride resists.

DYEING DIRECTIONS.

Helindone Yellow CG can be printed in slightly alkaline pastes reduced or not; in strongly alkaline pastes with Hydrosulphite NF conc., and also on glucose prepared material.

The following formula gives the most satisfactory results:

300 parts Helindone Yellow CG Paste
570 parts Alkaline Thickening
100 parts Hydrosulphite NF conc. Solution 1 to 1
30 parts Anthraquinone 30 per cent. Paste.

1000 parts.

After printing and drying the goods are steamed in the Mather-Platt, free from air, with moist steam for three minutes at 215° F., washed, and soaped at the boil.

ALKALINE THICKENING.

100 parts British Gum
900 parts Caustic Soda Solution 40° Bé.

1000 parts.

HELINDONE BROWN CR.

This product gives shades of excellent fastness to soaping and light when printed in alkaline pastes with Hydrosulphite NF

conc. It can be padded and in light shades discharged with Hydrosulphite CL, or with NF conc. and Discharge Base. It can also be used with zinc chloride resists.

PRINT COLOR.

300 parts Helindoil Brown CR Paste
are stirred cold in
400 parts Wheat Starch Tragacanth Thickening.
Then the following are added cold, in order:
100 parts Glycerine
60 parts Potassium Carbonate
30 parts Dissolving Salt B.
previously dissolved in
30 parts Water
80 parts Hydrosulphite NF conc., Solution 10 to 6.

1000 parts.

REDUCING PASTE.

650 parts Gomme Industrielle
50 parts Glycerine
20 parts Potassium Carbonate
20 parts Dissolving Salt B Solution 1 to 1
20 parts Hydrosulphite NF conc., Solution 1 to 1
240 parts Water.

1000 parts.

After printing and drying, the material is steamed for three minutes in the Mather-Platt free from air with moist steam at 215° F., well washed and soaped for ten minutes at the boil. In printing this color, the dyestuff is not reduced before printing, but the reduction takes place in the steaming process.

PADDING LIQUOR.

20 parts Helindone Brown CR Paste
50 parts Tragacanth 6 to 100

4 parts Potassium Carbonate
5 parts Turkey-red Oil (soda)
6 parts Hydrosulphite MLB conc. Powder
1 part Anthraquinone Paste 30 per cent.
200 parts Water at 175°

Stir together until the dyestuff is reduced, then add

10 parts Caustic Soda Solution 40° Bé.
This dissolves the leuco compound first formed.
696 parts Hot Water
8 parts Hydrosulphite NF conc., Solution 1 to 1.

1000 parts.

The material is padded hot, printed with the Discharge White, dried, steamed three minutes in the Mather-Platt at 215° F., washed and dried.

DISCHARGE WHITE.

400 parts British Gum Thickening
100 parts Zinc White 1 to 1
200 parts Blanc Fixe 1 to 1
40 parts Anthraquinone 30 per cent. Paste
150 parts Hydrosulphite CL
50 parts Glycerine
60 parts Water.

1000 parts.

DIANIL GREEN E.

This is a direct-dyeing color for cotton and silk, which can be developed with diazotized paranitaniline and can also be diazotized and developed with the various developers. Paranitraniline development gives bright green shades, beta-naphthol, rescorcine, and metatoluylene-diamine, while yellower shades are produced with Dianil Developers G and 3G. These are of

good fastness to washing, soap, and light. Dianil Green E is not affected by metals. The direct dyeings, also those developed with the various developers except Dianil Developer 3G can be discharged with Hydrosulphite NF conc. Dianil Developer 3G requires the addition of Discharge Base to the printing paste.

DYEING DIRECTIONS: Dianil Green E dyed at the boil with the addition of twenty pounds salt and one to two pounds soda ash to the dye bath.

DEVELOPMENT—AZOPHOR RED.

The dyeings are rinsed and developed for one-half hour in a cold bath containing one to two pounds Azophor Red and eight ounces to one pound sodium acetate. The material is then well washed.

DEVELOPMENT WITH DIAZOTIZATION.

The direct dyeings are rinsed for three-quarters of an hour in a cold bath containing

1½ to 2½	lbs.	Sodium Nitrite
5 to 7	lbs.	Muriatic Acid.

Rinse and work for one-half hour in a fresh bath, cold, containing one to two pounds Dianil Developer G or 3G, then rinse and soap if necessary.

The Developer G may be dissolved in hot water, but to dissolve the Developer 3G, two and one-half gallons hot water and five pounds caustic soda solution 40° Bé. to each two pounds developer are required. The solution is strained and added to the bath.

For discharging, the following formulas are used:

DISCHARGE WHITE I FOR ORDINARY DEVELOPMENT.

500 parts Wheat Starch Tragacanth
100 parts Hydrosulphite NF conc.

200 parts Water
200 parts Zinc White Paste 1 : 1.

1000 parts.

DISCHARGE WHITE II FOR DIANIL DEVELOPER 3G.

500 parts Wheat Starch Tragacanth
100 parts Hydrosulphite NF conc.
160 parts Water
10 parts Discharge Base No. I
30 parts Anthraquinone Paste
200 parts Zinc White Paste 1 : 1.

1000 parts.

The developed dyeings are well washed and printed with the suitable discharge paste, then dried and steamed for three minutes in the Mather-Platt at 216° F., washed, and dried.

PARAPHOR BROWNS RK, SK, AND TK.

These colors which are developed with diazotized paranitraniline and without intermediate drying yield deep, even shades, distinguished for very satisfactory fastness to washing, soaping, and light.

As the drying operation after padding is dispensed with, the whole process of dyeing is considerably cheapened. The fastness to rubbing of the browns produced without drying is excellent; the process is especially suitable for goods which have to be napped afterwards.

Paraphor Brown TK yields rather darker and yellower shades than the RK brand. The properties are the same; the fastness to light of Paraphor Brown TK is slightly superior to that of RK. Paraphor Brown SK gives an olive-brown which is yellower than the RK or TK.

Notes on Processes, New Colors, etc.

DYEING DIRECTIONS.

For preparing the padding bath the dyestuff is dissolved in hot water with the addition of soda. The addition of soda is especially important if hard water is used. For goods which wet out with difficulty, some Turkey-red oil or similar product is added to the padding bath. The depth of the brown is not dependent on the temperature of the padding liquid which may be used either cold or lukewarm, but it depends on the concentration and the speed with which the goods are passed through the liquid. Consequently, it is essential that the padding machine works evenly and regularly, and that both the padding liquid and developing bath are regularly replenished.

The bleached goods are padded on the three-roller padding machine; the pressure is so regulated that the material increases 90 per cent. in weight. Thick goods are padded twice, thin material, once, cold or lukewarm. After allowing the goods to lie for one hour, they are passed through the three-roller padding machine with reduced pressure through the developing bath, allowed to lie for one hour, then washed and dried. Soaping is not necessary.

After drying, the developed brown can be discharged with Hydrosulphite Discharge colors. The goods are steamed for three minutes in the Mather-Platt, free from air, at 212° F., and then washed in warm or cold water in the usual manner.

BROWN PADDING LIQUOR 1½ PER CENT.

15 parts Paraphor Brown SK
5 parts Sodium Carbonate dry,
made up to

1000 parts.

PARANITRANILINE DEVELOPING BATH.

14 parts Paranitraniline extra
are dissolved in

120 parts Hot Water and
22 parts Hydrochloric Acid 22° Bé.

Then cool with

50 parts Water
50 parts Ice

And add at 32° to 35° F.,

26 parts Sodium Nitrite Solution, 29 to 100.

Stir well, then allow to stand, strain, and before using add

30 parts Sodium Acetate, dissolved in water
make up to

1000 parts.

WHITE DISCHARGE.

150 parts Hydrosulphite NF conc.
150 parts Gum Water 1 to 2
400 parts Neutral Starch Tragacanth Thickening
150 parts Zinc Oxide 1 to 1
15 parts Ultramarine 1 to 1
135 parts Water

1000 parts.

PARAPHOR GREEN B.

This is a new direct-dyeing cotton color, which yields green shades on development with Azophor Red or diazotized Paranitraniline. They are fast to washing and the fastness to light is sufficient for most purposes. The developed dyeings are easily discharged with Hydrosulphite NF conc., and the whites do not tarnish on storing. On this account the color is of special interest for discharge work.

DYEING DIRECTIONS.

Paraphor Green B is dyed the same as other one-dip colors, at the boil with the addition of salt or Glauber's salt and soda to the dye bath. The material is washed after dyeing and developed in a fresh bath cold for one-half hour with one to two pounds Azophor Red or diazotized Paranitraniline and eight ounces to one pound sodium acetate. It is then washed and soaped.

DISCHARGE WHITE.

100 parts Hydrosulphite NF conc.
350 parts Water
450 parts Wheat Starch Tragacanth Thickening
50 parts China Clay
50 parts Water

1000 parts.

After printing and drying, the material is steamed three minutes in the Mather-Platt, washed, and dried.

COLORED PAPERS.

Paper dyeing proper is one of the younger branches of the art of dyeing, and is, therefore, not so thoroughly developed as the dyeing of cotton or wool. Its growth really began with the introduction of the coal-tar colors. Paper has been concisely defined as "an aqueous deposit of vegetable fibres." The vegetable fibres may be any variety of cellulose; and there are used as raw materials cotton and linen rags, hemp, jute, and manila wastes, grasses (straw, esparto, and bamboo) and woods, either in the natural lignified states or purified from lignine. Whether these materials are used in an unbleached or bleached condition, they are all submitted to a preliminary alkaline boil, with the exception of mechanical wood.

By far the larger proportion of paper, amounting to 90 per

cent. of the world's total production, is produced from wood pulp. During the process of purification and pulping, all the materials are resolved into their ultimate or shortest fibres, filaments being the exception. The ultimate fibres are further reduced, if necessary, in the beating engine to a length varying from ½ mm. to 4 mm. During the beating, the fibres become hydrated, which generally increases the capacity of the pulp to retain additions, such as loading, color, etc.

During the beating process, the additions should be made in the following order: (1) Loading, *e.g.*, China clay, sulphate of lime, French chalk, and blanc fixe; (2) Coloring matters; (3) Stiffeners, *e.g.*, starch, or sizing agents, *e.g.*, resin soap, followed last of all by (4) Sulphate of clay.

The proportion of the dry fibre to water, *i.e.*, the strength of the dye bath, may vary considerably, according to the physical qualities of the paper made. The "stuff density" may be as high as 10 per cent.

After treatment in the beating engine, the pulp is let down into a chest provided with slow-moving agitators and acting as a reservoir for the paper machine. There the pulp is reduced to about 1 per cent. stuff density before being made into paper. The pulp should be as free as possible from residual chemicals. Lime salts are apt to cause dull shades, besides causing trouble with the sizing. Lime in straw pulp is sometimes neutralized by acid, and active chlorine is always carefully removed by antichlors.

Colored papers are made by three processes. First, by incorporating pigments with the pulp, which bodies do not in a real sense dye the fibres but only attach themselves thereto and reflect colored light; second, by actual dyeing of the fibres through and through, whether done in the pulp or in the finished paper; third, by coating and enamelling processes applied to the finished paper.

The first method involves the use of such pigments as umbers,

ochres, iron oxides, mineral blacks, etc. Chrome yellows are produced on the fibre by the intersection of soluble lead salts and brichromate of soda. Smalts is used for expensive papers. Ultramarine, owing to its permanence to light, is much used for blueing, but it is very sensitive to acid. Prussian Blue may be produced on the fibre by the interaction of iron salts and yellow prussiate. It is very resistant to dilute acids, but is sensitive to alkalis; nevertheless, it is a useful color, and so far has met no serious opponent among the coal-tar dyes. Various vat dyes and insoluble azo colors have been introduced, for example, Autol, Lithol, Helio, etc., but their high price is against them.

The second method consists in dyeing the fibre in the real sense of the word. Vegetable extracts were formerly used, such as Safflower, Annatto, Redwood, etc., but the only natural dyes now used are Logwood and Catechu. With chrome or iron mordants these are still largely in use for brown and black shades.

The development of paper dyeing, however, dates from the introduction of coal-tar colors. These at first were of the basic class and were crude and garish in color. Almost all classes of dyes are now used—basic, acid, substantives, resorcine, sulphide, and vat dyes. Attempts to utilize the so-called ingrain or diazotized colors have not met with success. Insoluble colors are added to the pulp-like pigments; soluble colors are dissolved in water and added to the beating engine before the size and alum.

The purity and composition of the cellulose in the pulp greatly affect the results obtained; first, as regards affinity for dye, and, second, as regards the nature and depth of shade.

Wrede has proposed a method for estimating the affinity of a pulp for a dyestuff. The dye is dissolved in water and measured quantity is added to a known weight of pulp which is then beaten up with water. After standing for a definite period, an aliquot part of the liquor is withdrawn and matched by adding a standard solution of the same dye water in a comparison cylinder. The quantity of dye fixed can then be calculated.

The method also gives interesting data regarding the rate at which the dye is absorbed and fixed under different conditions. The rate is at first rapid and then becomes slower until equilibrium is reached. Regarding the affinity of color loadings, it may be assumed that the universal loading is China clay. This is dyed by basic and substantive dyes, but not by acid dyes. Alum acts as a mordant for all paper dyes, more or less, but the use of alum alone without resin would not produce a sized paper, and, therefore, the affinity of resin-size precipitate must also be taken into account. When resin soap is precipitated in the pulp by alum, there may be formed resinate of alumina and resinates of any other bases present, *e.g.*, lime, magnesia, iron, also hydrate of alumina, and basic aluminium compounds, besides free resin. Free resin acids are appreciably colored by basic dyes. Resinate of alumina, on the other hand, has an affinity for acid dyes.

It will be obvious that dyeing under such conditions is a combination of processes, namely, dyeing of the fibres themselves, dyeing of loadings, and other substances in and upon the fibres. In some cases it might be profitable from a dyer's point of view to mordant the pulp with alum before dyeing; but practice has shown that the best results in sizing are got by following the usual order of additions, namely, dye, size, alum.

Basic dyes, such as Magenta, Diamond Green, Auramine, etc., are very fugitive to light, but produce rich, deep shades very economical for news and cheap printings and papers whose purpose is ephemeral. They require sizing to insure complete utilization and their backwater is very free from color. They have, however, a tendency to "strike" on some fibres and produce a "haired" effect.

Substantive dyes, such as the Benzo and Diamine colors, appear to best advantage in unsized papers, where their brightness of shade is not impaired by the presence of metallic mordants. In sized papers their application is limited by the degree of brightness attainable. They give a clear backwater.

Acid dyes, such as Orange, Water Blues, Ponceaux, etc., are superior to the basic colors in fastness to light, but owing to their lack of affinity to cellulose require the pulp to be well sized. The backwater is always highly colored, especially in the case of deep shades. In some cases it is possible to cause complete fixation by the use of metallic mordants, but these generally produce a radical alteration in the tone and brilliancy of the shade. Something can occasionally be done by utilizing the property of acid and basic colors to precipitate each other, the pulp being dyed first with a basic and then an acid color.—J. Reid in *Journal Society of Dyers and Colorists.*

LAKE COLORS.

BRILLIANT PATENT BLUES A, AA, AR, AZR.

These dyestuffs are suitable for making brilliant greenish-blue lakes. They will be found of interest for wallpaper colors and similar products.

DIRECTIONS FOR PRECIPITATION.

20 parts Alumina Sulphate, 18° Al_2O_3 dissolved in
200 parts Water
20 parts Heavy Spar
10 parts Sodium Carbonate dry dissolved in
100 parts Water
5 parts Dyestuff dissolved in
250 parts Water

Precipitate at 105° F. with

32 parts Barium Chloride dissolved in
320 parts Water.

LAKE FROM METANITROPARATOLUIDINE.

PREPARATION OF THE DIAZO SOLUTION.

15.25 parts Metanitroparatoluidine Base Cryst,
made well into a paste, together with

34.5 parts Hydrochloric Acid 20° Bé.,
then let stand for six to eight hours.

(The mixture is nearly white by this time and is easily thinned with water and diazotizes well.) Dilute with

120 parts Water and run through a sieve,
diazotize while stirring constantly at
41° F. with
7.6 parts Sodium Nitrite, dissolved in about
70 parts Water.

Stir for about twenty minutes until the diazotization is finished. The diazo solution must be kept cold until coupled. Use ice if necessary.

PREPARATION OF THE BETA-NAPHTHOL SOLUTION.

15 parts Beta-naphthol, dissolved in
12 parts Caustic Soda Solution 40° Bé.
and some hot water, then dilute to about
150 parts and add
8 parts 58 per cent. alkali, dissolved in about
80 parts Water.

PREPARATION FOR THE ROSIN SOLUTION.

10 parts Rosin
2 parts 58 per cent. alkali
15 parts Water.

Boil for two hours.
Make up to 100 parts.

PIGMENT SCARLET 3B INSOLUBLE IN WATER FOR PRINTING INK.

10 parts Sulphate of Alumina dissolved in
100 parts Water

5 parts Soda Ash dissolved in
50 parts Water.
Precipitate at 120° F.
Wash four times.
6 parts Pigment Scarlet 3B dissolved in
50 parts Water.
1.3 parts Zinc White made into a paste with water, then add more water and run through sieve.
Precipitate cold with
9 parts Barium Chloride dissolved in
90 parts Water.

PART V

Educational

Educational

THE PHILADELPHIA TEXTILE SCHOOL OF THE PENNSYLVANIA MUSEUM AND SCHOOL OF INDUSTRIAL ART.

The Department of Chemistry, Dyeing, and Textile Printing has, during the past year, undertaken some important changes in its curriculum, among which may be mentioned the increase of time devoted to Industrial and Organic Chemistry from one year to one and a half years each, which changes have proven highly satisfactory to both the faculty and the student body. A further change is contemplated for the coming year whereby the amount of laboratory work in the study of the various textile fibres will be considerably increased. The new bleach house erected and equipped some eighteen months past has proved to be the most valuable addition to the teaching facilities of the department that has been made during the last decade. No change has been made in the staff of teachers during the past five years, and it is the earnest co-operation of these men, in eliminating antiquated processes and installing the best of modern thought and method, that has resulted in an eminently practical course of study.

A brief outline of the course as presented to the day classes is given below:

SUBJECTS OF STUDY FOR THE THREE-YEAR COURSE.

First Year—First Term.

Chemistry I.—General Inorganic.

Dyeing I.—Physical and Chemical Properties of the Textile Fibres.

Dyeing II.—Technology of Scouring and Bleaching.
Dyeing III.—Principles of Dyeing; Elementary Course.

FIRST YEAR—SECOND TERM.

Chemistry II.—Qualitative Analysis.
Chemistry VI.—Chemical Calculations.
Dyeing II.—Technology of Scouring and Bleaching.
Dyeing III.—Principles of Dyeing; Elementary Course.
Dyeing IV.—Principles of Shade Compounding and Matching.

SECOND YEAR—FIRST TERM.

Chemistry IIIa.—Quantitative Analysis; Gravimetric.
Chemistry IVa.—Organic Chemistry; Aliphatic Series.
Chemistry IXa.—Textile Chemistry; Anaylsis of Fibres, Yarns, and Fabrics.
Dyeing V.—Color Mixing and Spectroscopy.
Dyeing VI.—Principles of Dyeing; Intermediate Course.

SECOND YEAR—SECOND TERM.

Chemistry IIIb.—Quantitative Analysis; Volumetric.
Chemistry IVa.—Organic Chemistry; Aliphatic Series.
Chemistry V.—Industrial Chemistry.
Chemistry IXb.—Textile Chemistry; Analysis of Dyestuffs and Mordants.
Dyeing VI.—Principles of Dyeing; Intermediate Course.

THIRD YEAR—FIRST TERM.

Chemistry IVb.—Organic Chemistry; Aromatic Series.
Chemistry V.—Industrial Chemistry.
Chemistry VII.—Technical Analysis.
Chemistry IXc.—Textile Chemistry; Testing Dyestuff Reactions and Adulterations.
Dyeing VII.—Textile Printing.
Dyeing VIII.—Principles of dyeing; Advanced Course.

Philadelphia Textile School Dyehouse

Lowell Textile School

THIRD YEAR—SECOND TERM.

Chemistry V.—Industrial Chemistry.

Chemistry VII.—Technical Anaylsis.

Chemistry VIII.—Chemistry of Dyestuffs.

Chemistry IXd.—Textile Chemistry; Testing Dyes for Fastness and Reactions on the Fibre.

Dyeing VII.—Textile Printing.

Dyeing VIII.—Principles of Dyeing; Advanced Course.

Evening courses are also offered in Elementary Chemistry, Qualitative and Quantitative Analysis, Organic and Textile Chemistry, and in Dyeing.

The courses in Elementary Chemistry and Dyeing are especially designed to meet the needs of dyers' helpers, dry cleaners, and others employed in the textile industry during the day, while the advanced courses in Chemistry are made broad enough to be of general application.

An illustrated circular explaining in detail the day and evening courses of instruction in almost every branch of the textile industry will be mailed upon request.

LOWELL TEXTILE SCHOOL.

The course in Textile Chemistry and Dyeing at the Lowell Textile School, up to the present time, has extended through three years. During the year 1911 a more advanced four-year course was instituted, and the Trustees of the school petitioned the Massachusetts State Legislature for permission to grant a degree, equivalent to that of Bachelor of Science, to such students of the Lowell Textile School who should satisfactorily complete this four-year course.

This four-year course is in outline as follows:

CHEMISTRY AND TEXILE COLORING.

First-year Subjects.	First Term.				Second Term.			
	Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.	Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.
Chemistry inor	10	150	5	5	2.5	37.5	2.5	—
Chemistry org	—	—	—	—	2.5	37.5	2.5	—
Stoichiometry	—	—	—	—	2	30	2	—
Qual. analysis	—	—	—	—	13.5	202.5	2	11.5
Mechanism	4	60	4	—	—	—	—	—
Mech. drawing	4	60	—	4	2.5	37.5	—	2.5
Mathematics	3	45	3	—	4	60	4	—
Textile design	4	60	2	2	—	—	—	—
English	2	30	2	—	2	30	2	—
German	3	45	3	—	3	45	3	—
Physical educa	4	30	—	2	2	30	2	—
Totals	32	480	19	13	34	510	20	14

Second-year Subjects.	First Term.				Second Term.			
	Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.	Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.
Adv. inor. chem	3	45	3	—	2	30	2	—
Adv. organic	2	30	2	—	2	30	2	—
Tex. chem. and dyeing	7	105	3	4	2	30	2	—
Quant. analysis	10	150	1	9	14	210	1	13
Indust. chemistry	3	45	—	3	6	90	—	6
Steam engineering	2	30	2	—	—	—	—	—
Physics	2	30	2	—	3	45	2	1
Indust. history	2	30	2	—	2	30	2	—
German	3	45	3	—	3	45	3	—
Totals	34	510	18	16	34	510	14	20

Third-year Subjects.	First Term. Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.	Second Term. Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.
Adv. tex. chem	16	240	1	15	10	150	1	9
Indust. chem	2	30	2	—	2	30	2	—
Quant. analysis	10	150	1	9	10	150	1	9
Physical chem	2	30	2	—	1	15	1	—
Org. chem. lab	—	—	—	—	5	75	—	5
Wool and wor. finish	2	30	1	1	4	60	1	3
Technical German	2	30	2	—	2	30	2	—
Totals	34	510	9	25	34	510	8	26

Fourth-year Subjects.	First Term. Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.	Second Term. Hours per week.	Hours per term.	Lecture or recitation.	Laboratory.
Quant. and ind. anal	6	90	1	5	5	75	1	4
Adv. tex. chem. and dye	6	90	1	5	—	—	—	—
Engineering chem	1	15	1	—	—	—	—	—
Adv. or chem. (dyestuffs)	1	15	1	—	—	—	—	—
Organic chem	8	120	—	8	8	120	—	8
Micro-photograph	—	—	—	—	5	75	—	5
Tech. Germ	2	30	2	—	—	—	—	—
Thesis	10	150	—	10	15	225	—	15
Totals	34	510	6	28	33	495	1	32

In their petition to the Legislature, the Trustees state that: "The chemistry and dyeing department offers a thorough four years' course in inorganic, organic, physical, and analytical chemistry, co-related to which are the applied branches of textile

chemistry, dyeing, industrial and engineering chemistry, and the technical analysis of industrial materials.

"The pupils receive such instruction in mathematics, drawing, physics, German and English, as is deemed essential or desirable to the branch of textiles they specialize in, and in the fourth year in addition to advanced textile technique are further instructed in scientific mill management, cost finding, physics, corporation organization, essentials of contracts, banking, etc., commercial practice and patent law and patent office practice."

The petition of the Trustees was referred, by the Legislature, to the State Board of Education, who, after a thorough investigation, returned a favorable report to the Legislature. The following is taken from their report to the Legislature:

"The Lowell Textile School proposes to require applicants to present credentials equivalent to those required for admission to other Massachusetts colleges and not inferior to those suggested by the Carnegie Foundation for the Advancement of Teaching.

"V. The Lowell Textile School has an annual budget of over $70,000 and a faculty of at least thirty members, together with extensive equipment.

"VI. An examination of the organization and administration of the school, the qualifications of its faculty, the educational functions which it is expected to fulfill in the Commonwealth, as well as the possibilities of higher education in connection with certain branches of the textile industry lead the Board to the following conclusions:

"1. The textile industry plays a large part in the economic and industrial development of Massachusetts.

"2. To an increasing extent the evolution of the textile industry is dependent upon engineering knowledge and ability for research, particularly in connection with the finer grades of work which it is desirable that Massachusetts should produce.

"3. There is a considerable demand in the textile industry for engineers and other specialists who shall have had the

equivalent of a technological education not inferior to that given by institutions which are authorized to confer degrees.

"The technological schools of the Commonwealth do not, at the present time, give courses leading to proficiency in textile engineering or in the chemistry of textile dyeing.

"There are three distinct types of education which a well-equipped and properly staffed textile school can offer.

"(*a*) Professional or technological. Students in this division should have had a complete secondary education as a prerequisite. At least four years' work should be required, a large part of which should be in the sciences underlying the processes involved in the textile industry.

"(*b*) Technical, especially for foremen and other specialists. For admission to courses in this field, requirements need not be as extensive as in the case of the former, nor is it necessary that the courses should be four years in length. Furthermore, the relative amount of science required need not be so large as that for the technological courses.

"(*c*) Trade instruction, especially in the evening schools. Since the technological instruction described under (*a*) should require previous preparation equal at least to that requisite for admission to colleges and technological institutions; since courses required should extend through at least four years; and since these should embrace a relatively large amount of fundamental science, mathematics, foreign language, and other subjects designed to give a broad professional education, the completion of a proper number of prescribed courses in such work might well be recognized by appropriate degrees.

"There is sufficient demand within the State of Massachusetts from the standpoint of the needs of the textile industry itself, as well as from the standpoint of young persons seeking to qualify themselves for the higher positions in connection with that industry, to justify the maintenance, in a properly equipped school within the State, of courses equivalent to those described

above as technological; and such courses might well lead to some form of appropriate degree.

"The Lowell Textile School has at the present time ample equipment and a faculty sufficiently large and well qualified to carry out properly courses of a technological nature; and the trustees and faculty are sufficiently appreciative of the responsibility connected with such work as to afford the requisite assurance that the privilege of giving degrees will not be abused."

The introduction of this four-year course, with the granting of a degree, is an important step in the development of education in Textile Chemistry in the United States.

BRADFORD-DURFEE TEXTILE SCHOOL.

FRED. H. WEBSTER, *Professor of Chemistry and Dyeing.*

The year which is passing has witnessed the usual increase in numbers and equipment which has been a characteristic of the school from the beginning and is an ample indication of its healthy growth.

Fall River, the great centre of cotton manufacturing in America, with its many mills and large corporations, in order to maintain its leading position in the industry, must have operatives well trained in theory as well as practice in the construction and operation of the various types of improved machinery necessary for the production of perfect cloth from the raw cotton.

The fact that many hundreds of the operatives of Fall River mills have taken advantage of the opportunity to increase their efficiency and money-earning power by attending the Bradford-Durfee Textile School is a good indication of the value of the school to the community. Last year there were upwards of 1300 applicants for admission to the evening courses. The fact that mill superintendents appreciate the value of operatives who have attended the school, as shown by their promotion to positions

New Bedford Textile School Laboratory

of responsibility in the mills, is a good proof of the value and usefulness of the school.

The persistent growth of the school has been met with the necessary additions of buildings and other facilities. A new power plant now in process of installation at a cost of $20,000 will be ready for use in the fall. The engineering laboratories for shop work, steam, and electricity have been greatly enlarged the past year and a fine equipment installed.

In the Chemistry and Dyeing Department the addition of a laboratory for advanced and special students in conjunction with a reading room, equipped with a chemical reference library and periodicals, has greatly improved the efficiency of the department during the past year.

The dyehouse for practical work which the department has gradually outgrown will be replaced next year by one more than twice as large, equipped with additional machinery for chain and skein dyeing. The appropriations have already been granted by the State and the work will be pushed as rapidly as possible.

It is the aim of the Chemistry and Dyeing Department to maintain a high standard both by judicious entrance requirements and by a curriculum which will turn out a practical graduate, acceptable to whoever is in search of a capable textile chemist.

NEW BEDFORD TEXTILE SCHOOL.

WILLIAM E. HATCH, A.M., *President and Manager.* EVERETT H. HINCKLEY, S.B., *Principal of Chemistry and Dyeing Departments.*

This school, with its latest addition, now occupies two buildings, the machinery building and the recitation building, with a floor space of 84,000 square feet. The first floor of the machinery building is devoted to picking, carding, and spinning; the second floor to warp preparation and weaving; the third floor to hand-looms connected with the Designing Department and to an extensive Knitting Department. In the basement of the

recitation building is located a laboratory for Mechanical Engineering and space reserved for a gymnasium, and a laboratory for bleaching. The machine shop and laboratories for the Chemistry and Dyeing Departments, and a chemical lecture-room, are located on the first floor. There is located on this floor, also, a spacious room for bleaching, dyeing, and finishing cloth on a commercial scale, but not yet equipped.

The space devoted to Chemistry and Dyeing is quadrupled. There is a large laboratory devoted to general Chemistry and Dye-testing, with ample facilities for all ordinary work. Ample hood-space has been furnished, with excellent draught. Each student is provided with a desk eight feet four inches by two feet six inches, connected to which are water, gas, and waste pipes. At one end of each desk is a hood supplied with water, gas, steam, and waste pipes. At the other end is the sink and an individual dye bath accommodating twenty-eight dye-pots. Along the wall is situated apparatus for treating small lots of raw stock, yarn, or cloth. Adjacent to this laboratory is a room devoted to weighing, microscopic, and photometric work.

All students taking the regular cotton manufacturing, or the knitting course, are given Chemistry during the first year and Dyeing the second year. Every effort is made to make this course as practical as possible. Especial attention is paid to the Chemistry of the flue gases, oils, and sizing mixture. In connection with the Dyeing, special emphasis is placed on those points that are of interest to the cotton manufacturer.

The New Bedford Textile School is an institute of textile technology with especial regard to the manufacture of cotton goods. Hence, in this special course, the major part of the time is spent in the study of Chemistry and Dyeing of cotton. As far as possible, artificial laboratory conditions are avoided and the students daily analyze, use, and match products of current commercial interest. Practically all the text used in the second year has been written especially for the school as no text-books, concise and accurate enough for this purpose, are available. The

The A. French Textile School. Georgia School of Technology

student is required continually to consult books of reference on the various subjects taught, to develop habits of original research. For this purpose, a well-selected library is owned by the school and, by special arrangement, the students at the school may consult any book in the large public library of the City of New Bedford.

Students wishing a more exhaustive course may pursue a third year, the greater part of which is devoted to special work of practical interest to the students in question.

GEORGIA SCHOOL OF TECHNOLOGY.

The A. French Textile School.

The general course of instruction in this department of the school has been extended and broadened in its scope during the past year. Students in this department are given a thorough course in all shop work, academic, and engineering subjects in connection with the study of those branches relating directly to the textile industry and commonly taught in a textile school.

The school offers two courses with reference to textile subjects: First, a regular four-year course, leading to a degree of Bachelor of Science in Textile Engineering; second, a special two-year course, designed to meet the demands of a limited number of students who may not have the time or the means to pursue the regular course.

The course in Textile Chemistry and Dyeing is attended by all students in this department. The instruction in Elementary and the more Advanced Chemistry is taken up during the first two years of the course. The subjects of Textile Chemistry, Bleaching, and Dyeing are commenced at the end of this time and their study continued for the remaining two years, the work in these subjects being done by means of notes, lectures, recitations from the text, experimental laboratory, and dyehouse practice. In order to make the work in this department more practical, all dyed and bleached yarns used in the Weaving Department are prepared in our dyehouse by the students.

All special students are given a preliminary course in Elementary Chemistry before beginning the subjects of Bleaching and Dyeing. During the past year new equipment has been added to the Dyeing and Bleaching Department, and our capacity for doing work in accordance with new and up-to-date methods greatly increased.

BOOKS OF THE YEAR.

ENGLISH AND AMERICAN.

NITROCELLULOSE INDUSTRY: A COMPENDIUM OF THE HISTORY, CHEMISTRY, MANUFACTURE, COMMERCIAL APPLICATION, AND ANALYSIS OF NITRATES, ACETATES, AND XANTHATES OF CELLULOSE, AS APPLIED TO THE PEACEFUL ARTS, WITH A CHAPTER ON EXPLOSIVES.

By Edward Chauncey Wooden, Ph.C., M.A.
Constable & Co., Ltd., London, 1911.

PRINCIPLES OF BLEACHING AND FINISHING OF COTTON.

By S. R. Trotman, M.A., and E. L. Thorp.
Charles Griffin & Co., London.
J. B. Lippincott Company, Philadelphia, 1911.

YARN AND WARP SIZING IN ALL ITS BRANCHES.

By Carl Kretschmar. Translated by Charles Salter.
Scott, Greenwood & Son, London, 1911.

DRESSINGS AND FINISHINGS FOR TEXTILE FABRICS AND THEIR APPLICATION.

By Fredrich Potteyn. Translated by Charles Salter.
Scott, Greenwood & Son, London, 1911.

Educational

DICTIONARY OF APPLIED CHEMISTRY.
By Sir Edward Thorpe, LL.D., F.R.S.
Longmans, Green & Co., London and New York, 1912.

FOREIGN.

SULFURIEREN, ALKALISCHMELZE DER SULFO-SAEUREN, ESTERIFIZIEREN.
Von Dr. H. Wichelhaus.
Verlag von Otto Spamer, Leipzig.

DIE KUENSTLICHE SEIDE.
Von Dr. Karl Suevern. Dritte Auflage.
Verlag von Julius Springer, Berlin, 1912.

DIE SCHWEFELFARBSTOFFE, IHRE HERSTELLUNG UND VERWENDUNG.
Von Dr. Otto Lange.
Verlag von Otto Spamer, Leipzig, 1912.

DIE BEDEUTUNG DES SAUERSTOFFS IN DER FARBEREI.
Von P. G. Unna und L. Goldetz.
Verlag von Leopold Voss, Leipzig und Hamburg, 1912.

FARBSTOFFTABELLEN.
Von Dr. Gustav Schultz.

Fuenfte, vollstaendig umgearbeitete und stark vermehrte Auflage der tabellarischen Uebersicht der im Handel befindlichen kuenstlichen organischen Farbstoffe von Gustav Schultz und Paul Julius.

Weidmannsche Buchhandlung, Berlin, 1912.

L'ACIDE FORMIQUE OU METHANOIQUE.
Par André Dubosc.
H. Dunod et E. Pinat, Paris, 1912.

PART VI

List of Dyestuffs, Makers, and Methods

List of Dyestuffs, Makers, and Methods

ABBREVIATIONS USED TO INDICATE THE DYESTUFF MANUFACTURERS AND THEIR AGENTS.

(A) Berlin Aniline Works, 213–215 Water St., New York; 122 Walnut St., Philadelphia; 124 Pearl St., Boston; 12 W. Kinzie St., Chicago; 9 E Pearl St., Cincinnati; 23 S. Tryon St., Charlotte, N. C. American agents for the Actiengesellschaft für Anilinfabrikation in Berlin.

(A A C) American Color & Chemical Co., Albany, N. Y. Agent (At). Consolidated with H. R. W.

(A C) Anchor Color Mfg. Co., 462 Cherry St., New York.

(A M) Actiengesellschaft für Chemische Industrie, Mannheim. Germany.

(Ash) T. C. Ashley & Co., 145 Milk St., Boston.

(At) F. E. Atteaux & Co., 176 Purchase St., Boston; 176 Fulton St., New York; 17 Kinzie St., Chicago; West Fulton St., Gloversville, N. Y.; 53 Colborne St., Toronto, Ontario; 15 Lemoine St., Montreal, P. Q.

(B) Badische Anilin und Sodafabrik, Ludwigshafen am Rhein, Germany. Agent (P K).

(B A Co.) British Alizarine Co., Ltd., Silverton, Victoria Docks, London, England. Agent (Bch).

(Bai) Bairstow & Co., 211 Pearl St., New York.

(B C F) Basler Chemische Fabrik, Basel, Switzerland. Consolidated with I.

(Bch) Beach & Co., Hartford, Conn. Agents for (B A Co.), (Br S), (E F W), (Grie) and (Rh).

(Bd) J. A. & W. Bird & Co., 43 Cedar St., New York. Agents for (ClCo) and (LD).

(B E) C. vom Bauer, Elberfeld, Germany.

(B K) Leipziger Anilinfabrik Beyer und Kegel, Leipzig, Germany.

(B L) Bosson & Lane, 36 Central Wharf, Boston, Mass.

(Br S) Brooke, Simpson & Spiller, Ltd., Hackney Wick, London, England. Agents (Bch).

(Bs) C. Bischoff & Co., 451–453 Washington St., New York; 229 N. Front St., Philadelphia; 124–126 Purchase St., Boston; 10 Weybosset St., Providence; 196 Michigan St., Chicago; 416 St. Paul St., Montreal. Agents for (RW) and (CJ).

(Bt) F. Bredt & Co., 240 Water St., New York; 12 S. Front St., Philadelphia. Agents for (K B).

(By) Farbenfabriken, vormals Fried. Bayer und Co., Elberfeld, Barmen, Schleploh, Leverkusen, Germany; Flers, France; Moscow, Russia. American agents, Farbenfabriken of Elberfeld Company, 117 Hudson St., New York; 32 India St., Boston; 27 Pine St., Providence; 9–11 N. Water St., Philadelphia; 146 W. Kinzie St., Chicago; 509–13 Trust Building, Charlotte, N. C.; 14 Front St., East, Toronto, Can.

(C) Leopold Cassella & Co., G.m.b.H., Frankfort-am-Main, Germany. Manufacture Lyonnaise de Matieres Colorantes, Lyons, France, and Russische Anilinfarbenfabrik, Riga. Agent (Math).

(C D C) Central Dyestuff and Chemical Co., Plum Point Lane, Newark, New Jersey.

(C J) Carl Jäger Anilinfarbenfabrik, Düsseldorf-Derendorf, Germany.

(Cl Co) The Clayton Aniline Co., Ltd., Clayton, Manchester, England. Agents (Bd), (Mz).

(C R) Claus & Rée, Droylsden, Manchester, England.

(C V) Colne Vale Chemical Co., Milnsbridge, Huddersfield, England.

(Cz) John Casthelaz, Bruère & Co., Belbeuf, Rouen, France.

(D) Farbenfabrik Dahl & Co., Barmen, Elberfeld, Germany. Wülfing, Dahl & Co., Inc., successors. Agents (Bs).

(D H) Farbwerke vormals Durand, Huguenin & Co., Basel and Hüningen.

(D W) L. Destree, A. Wiescher & Co., Haeren near Brussels, Belgium.

(E F W) Elton Fold Works, Bury, Lancashire, England. Agent (Bch).

(E H) E. de Haen, List, near Hanover, Germany.

(F) Farbwerk Friedrichsfeld, Mannheim, Germany.

(F G B) F. G. Brown, 112 N. Delaware Ave., Philadelphia.

(Fi) Alfred Fischesser & Co., Muhlhausen, Elsass, Germany. (Closed).

(F T M) Fabriques de Produits Chimiques de Thann et de Mulhouse, Alsace, Germany.

(G) Aniline Color and Extract Works, formerly John R. Geigy, Basle and Grenzach, Switzerland; Rouen, France; Moscow, Russia. Agent (Kell).

(Gau) Gauhe & Co., Eitdorf, Germany.

(Gb) Anilinfarbenwerk, vormals A. Gerber & Co., Basle, Switzerland. Absorbed by (I).

(Gei) Geisenheimer & Co., 189 Front St., New York; 19 Pearl St., Boston; 136 Chestnut St., Philadelphia; 391 Peachtree St., Atlanta, Ga. Agents for (O).

(GP) George Pickering & Co., Elmira, New York.

(Gr) Rob. Graesser Chemical Works, Ruabon, North Wales.

(Grie) Farbwerke Griesheim, Germany. Agent (Bch).

(Gt) Gilbert Aniline Co., Philadelphia.

(H) Read Holliday & Sons, Ltd., Huddersfield, England; 11 Gold St., New York; 125 Pearl St., Boston; 107 North Second St., Philadelphia.

(HM) Heller & Merz Co., Newark, N. J.; 503 Hudson St., New York.

(H R W) Hudson River Anilin Color Works, Albany, N. Y. Agent (By).

(H S) The Hanna-Schoelkopf Co., Schoelkopf, Hartford & Hanna Co., successors.

(I) The Society of Chemical Industry, Basle, Switzerland. Agent (Klp).

(In) Innis & Co., Innis, Spieden & Co., successors, 46 Cliff St., New York; 147 S. Front St., Philadelphia; 120 W. Kinzie St., Chicago; 220 Congress St., Boston.

(Jb) J. B. Ibels, Brussels, Belgium (Closed).

(J H) J. Hauff, Stuttgart, Germany.

(Jy) O. S. Janney & Co., 17 N. Water St., Philadelphia; 70 Kilby St., Boston. Closed.

(K) Kalle & Co., Inc., Biebrich-am-Rhein, Germany; **530 Canal St., New York; 145 Pearl St., Boston; 37 Letitia St., Philadelphia.**

(Kar) Ph. H. Karcher & Co., **14 Cedar St., New York. Closed.**

(K B) Küchler & Buff, Crefeld, Germany. Agent (Bt).

(Kell) Geigy Aniline and Extract Company, successors to John J. Keller & Co., 69 Barclay St., New York; 135 Pearl St., Boston; 40 North Front St., Philadelphia; 18 Prior St., Atlanta, Ga.; 56 S. Water St., Providence. Agents for (G). Geigy-ter-Meer Co., successors.

(Ki) Kinzelberger & Co., Prague, Austria.

(Klp) A. Klipstein & Co., 654 Greenwich St., New York; 50–52 N. Front St., Philadelphia; 283–85 Congress St., Boston; 145–147 W. Kinzie St., Chicago; 11 Pine St., Providence; 17 E. 4th St., Charlotte; 34 St. Peter St., Montreal, Can. Agents for (I) and (N).

(L) Farbwerk Mühlheim, vormals A. Leonhardt & Co., Mühlheim-am-Main, Germany. Agent (Bs).

(L D) Lepetit, Dollfus e Gansser, Susa, Milan, Italy. Agt. (Bd).

(Lev) Levinstein, Limited, Manchester, Blackley and Crumpsall, England. American Branches, I. Levinstein & Co., Boston; 219 N. Front St., Philadelphia.

(L F) L. B. Fortner, 36–38 Strawberry St., Philadelphia.

(L L) John W. Leitch & Co., Milnsbridge, England.

(L M) Leeds Mfg. Co., Brooklyn, N. Y.

(J D L) John D. Lewis, 3 and 4 Exchange Place, Providence, R. I. Agent for (L).

(Lo) Charles Lowe & Co., Stockport, England.

(L P) Lucien Picard & Co., St. Fons, Lyons, France. Operated by (A).

(L Sch) Lembach & Schleicher, Biebrich-am-Rhein, Germany.

(Ly) Thomas Leyland & Co., 60 India St., Boston, Mass.; 121 N. Front St., Philadelphia, Pa.

(tM) Chemische Fabriken, vorm. Weiler-ter Meer. Uerdingen, Germany. Agent (Kell).

(M) Farbwerke, vormals Meister, Lucius & Brüning, Höchst-am-Main, Germany, Creil and Moscow. Agent (Mz).

(Math) Cassella Color Co., successors to W. J. Matheson & Co., Ltd., 182–184 Front St., New York; 126–128 S. Front St., Philadelphia; 39 Oliver St., Boston; 64 Exchange Place, Providence; 47 N. Pryor St., Atlanta, Ga; 59 William St., Montreal.

(Mo) Société Chimique des Usines du Rhone, formerly Gillard P. Monnet & Cartier, St. Fons, Lyons, France.

(Mz) H. A. Metz & Co., successors to Victor Koechl & Co., 122 Hudson St., New York; 140–142 Oliver St., Boston; 104 Chestnut St., Philadelphia; 23 South Main St., Providence; 317 N. Clark St., Chicago; 210 S. Tryon St., Charlotte, N. C.; Empire Bldg., Atlanta, Ga.; Brown St. and Lister Ave., Newark, N. J.; 582 Howard St., San Francisco, Cal.; 30 St. François Xavier St., Montreal, Can.; 28–30 Wellington St. West, Toronto, Can.; Hamburg, Germany. Agents for (M), (W C B), (Cl Co).

(N) Carl Neuhaus, Elberfeld, Germany. Agent (Klp).

(Nat) National Dye Co., Philadelphia.

(N I) Farbwerk W. Noetzel, Istel & Co., Griesheim-am-Main, Germany.

(N Y B) New York & Boston Dyewood Co.

American Dyewood Company, successors, 156 William St., New York: 648 Bourse, Philadelphia; Boston, 115 High St.; Hamilton, Ontario.

(O) K. Oehler, Anilin u. Anilinfarbenfabrik, Offenbach-am-Main, Germany. Successors, Chemische Fabrik Griescheim-Elektron. Agent (Gei).

(O F) Erste Oesterreichische Sodafabrik, Hruschan.

(P) Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, France. A. Poirrier and G. Dalsace, Paris. Agent (S S).

(P C) Theodore Peters, Chemnitz, Germany.

(P K) Badische Company, 128 Duane St., New York; 86 Federal St., Boston; 80 S. Water St., Providence; 111 Arch St., Philadelphia; 305 Randolph St., Chicago; 592 Howard St., San Francisco; 214 Lemoine St., Montreal, Can. Agents for (B).

(P L) Pick, Lange & Co., Amersfoort, Holland. Closed. Chemische Fabreik Amersfoort successors.

(P S) Ferd, Petersen & Co., Schweizerhalle, Basle, Switzerland.

(R) Joh. Conr. Reihlen, Friedensau, Neuhofen, Germany.

(Rice) C. F. Rice, 174 Summer St., Boston.

(R D) Roberts, Dale & Co., Manchester and Warrington, England.

(R E) Remy, Erhart & Co., Weissenthurm-am-Rhein, Germany. Agent, Fr. Schroeder, 100 William St., New York.

(R F) Ruch et Fils, Pantin, France.

(Rh) Société Chimique des Usines de Rhone, France. Agent (Bch). See (Mo).

(S) Chemical Works formerly Sandoz, Basle, Switzerland.

(S B) A. Sevoz & Boasson, Lyons-Vaise, France.

(Sch) Schoellkopf, Hartford & Hanna Co., successors to the Schoellkopf Aniline & Chemical Co., Buffalo, N. Y.; 100 William St., New York. Selling agents, National Aniline and Chemical Co., New York, 100 William St.; Philadelphia, 109 N. Water St.; Boston, 36 Purchase St.; Providence, 28 N. Main St.; New Haven, Conn., 211 Water St.; Cincinnati, 232 E. Pearl St.; Chicago, 110 Michigan St.; Milwaukee, 175 Clinton St.; Kansas City, 413 W. 5th St.; Minneapolis, 114 Second St., North.

(SS) Walter F. Sykes & Co., 85 Water St., New York; 113

Broad St., Boston; 132 Chestnut St., Philadelphia. Agents for (P).

(St) The Stamford Mfg. Co., 133–137 Front St., New York.

(Th) E. M. Thayer & Co., 411 Atlantic Ave., Boston, Mass.

(U I) United Indigo & Chemical Co., 176 Federal St., Boston.

(V) Verein Chemischer Fabriken in Mannheim, Germany. Agent, Roessler & Hasslacher Chemical Co., 100 William St., New York.

(Va) H. S. Vila, 115 S. Second St., Philadelphia, Pa.

(R W) R. Wedekind & Co., Werdingen, Germany. Agent (Bs).

(W) Williams Bros., Hounslow, Middlesex, England.

(W C B) W. C. Barnes & Co., Ltd., Hackney Wick, London, England. Agent (Mz).

(Z) Friedrich Zimmer, Mannheim, Germany.

DYEING METHODS.

For economy of space, in order that the information may be more readily found, the dyeing methods are given by certain suggestive letters in accordance with the following:

WA indicates wool is dyed in acetic acid.

WN means that wool is dyed in a neutral bath.

WG indicates that wool is dyed in a bath containing Glauber's salt.

WGS means that wool is dyed with Glauber's salt and sulphuric acid in the bath.

WGSCh indicates that wool is first dyed with Glauber's salt and sulphuric acid in the bath and the color then developed with chrome.

WACh means that wool is first dyed with acetic acid and chrome added to develop the color.

WCh indicates that chromed wool is used with the dye.

SA means that silk is dyed in a bath acidified with acetic acid.

SS means that silk is dyed in a bath acidified with sulphuric acid.

CT indicates that the dyestuff is used on cotton mordanted with tannin.

CD means that cotton is dyed direct in one bath.

CDv indicates that the color is developed on cotton by subsequent treatment after direct dyeing.

CAl indicates cotton dyed with alum and Glauber's salt.

CWD—cotton and wool mixed goods dyed in one bath.

SULPHUR denotes one of the class of sulphur dyes requiring special treatment.

These extremely brief directions are used for the further reason that the dye manufacturers themselves prefer that specific information be obtained from their offices. In many places no dyeing suggestions are given on this account.

LIST OF DYESTUFFS, MAKERS AND METHODS.

Name of Dye.	Agent or Maker.	Dye Method.
Acetine Blue	PK	Printing
Acétinduline R	Mz	Printing
Acetopurpurine 8B	A	CD
Acetylene Blue 6B, 3B, Bx, 3R	Klp	CD
Acetylene Pure Blue	Klp	CD
Acid Alizarine Black 3B, 3Bex	Mz	WGSCh
Acid Alizarine Black R, AC, RH	Mz	WGSCh
Acid Alizarine Black SE, SET paste	Mz	WACh
Acid Alizarine Black SE, SET powder	Mz	WACh
Acid Alizarine Black SK, SKT	Mz	WGSCh
Acid Alizarine Black SN, SNT	Mz	WGSCh
Acid Alizarine Black T	Mz	WGSCh
Acid Alizarine Blue BB	Mz	WGSCh
Acid Alizarine Blue GR, SV	Mz	WGSCh
Acid Alizarine Blue Black B, 3B	Mz	WGSCh
Acid Alizarine Brown B, BB, RH, RP, RR	Mz	WGSCh

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Acid Alizarine Dark Blue SN	Mz	WGSCh
Acid Alizarine Garnet R	Mz	WGSCh
Acid Alizarine Gray G	Mz	WGSCh
Acid Alizarine Green B	Mz	WGSCh
Acid Alizarine Green G, 3G	Mz	WGSCh
Acid Alizarine Grenade R	Mz	WGSCh
Acid Alizarine Red B, G	Mz	WGSCh
Acid Alizarine Violet N	Mz	WGSCh
Acid Alizarine Yellow O, RC	Mz	WGSCh
Acid Anthracene Brown T, G, RH ext.	By	WGSCh
Acid Anthracene Red, G, BB	By	WGSCh
Acid Black	Mz	WGS
Acid Black B	AAC	WGS
Acid Black BE new	Klp	WGS
Acid Black B No. 4	AC	WGS
Acid Black 5B, 8B, FL	By	WGS
Acid Black 10B	Sch	WGS
Acid Black C, 3BL, T	Klp	WGS
Acid Black 77	AC	WGS
Acid Black 2531	Kell	SS
Acid Black 5534	H	WGS
Acid Black 5535	H	WGS
Acid Black J	NYB	WGS
Acid Black S, 3G	H	WGS
Acid Black SB, SB conc.	Mz	WGS
Acid Blue AA	Kell	WGS
Acid Blue BB	Sch	WGS
Acid Blue GG	Sch	WGS
Acid Blue FS, 466, GS	Mz	WGS
Acid Blue 76	Sch	WGS
Acid Blue 100	Sch	WGS
Acid Blue R	NYB	WGS
Acid Blue Black 3B	By	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Acid Brown	Bs	WGS
Acid Brown D	Math	WGS
Acid Brown G	A	WGS
Acid Brown R	A	WGS
Acid Brown Y	Sch	WGS
Acid Carmoisine B	Bk	WGS
Acid Carmoisine 6B	H	WGS
Acid Cerise	Mz, S S	WGS, SS
Acid Cerise O, ii	Mz	WGS, SS
Acid Chrome Black BG, WS, TC, RL	By	WGSCh
Acid Chrome Blue BRN, 3G, FFB, FFR, R	By	WGSCh
Acid Chrome Brown T	By	WGSCh
Acid Crimson	Bs	WGS
Acid Cyanine B, BD, BF, G, CD, GF	A	WGS
Acid Cyanine BR	By	WGS
Acid Eosine G	Mz	WGS
Acid Fuchsine	Mz, Bs, Klp	WGS
Acid Fuchsine S B	PK	WGS
Acid Green	By, Klp, O	WGS, SS
Acid Green B	P	WGS
Acid Green 2B	P	WGS
Acid Green 3B, 6B	By, P	WGS
Acid Green 4B	P	WGS
Acid Green bluish	NI	WGS, SS
Acid Green conc.	Mz	WGS
Acid Green conc. D	Mz	WGS
Acid Green conc. G	Mz	WGS
Acid Green conc. M	Mz	WGS
Acid Green conc. ii	Mz	WGS
Acid Green D	Mz	WGS, SS
Acid Green EC	Mz	WGS, SS
Acid Green extra conc. B	Math	WGS, SS
Acid Green extra conc. paste	Math	

Name of Dye.	Agent or Maker.	Dye Method.
Acid Green GG	H	WGS
Acid Green 5G	Math	WGS
Acid Green J	P	WGS
Acid Green JEEE	P	WGS
Acid Green M	Mz	WGS, SS
Acid Green M., 5 fold conc.	Mz	WGS
Acid Green O	Mz	WGS
Acid Green OG	O	WGS, CT
Acid Green 780	Math	WGS
Acid Grenadine	Kell	WGS
Acid Grenadine B	Kell	WGS
Acid Indigo Blue	Mz, H	WGS
Acid Magenta	Mz	PK, SS, WGS, SS
Acid Magenta B	Mz	WGS, SS
Acid Magenta BC Crystals	Kell	WGS, SS
Acid Magenta Crystals	Mz	WGS, SS
Acid Magenta GC Crystals	Kell	WGS, SS
Acid Magenta O	Mz	WGS, SS
Acid Marine Blue A	Math	WGS
Acid Maroon O	Mz	WGS, SS
Acid Methyl Violet S7B	PK	WGS
Acid Milling Scarlet	Br S	WGS
Acid Naphthol Orange		WGS
Acid Navy Blue	Bd	WGS
Acid Orange G	Kell	WGS, SS
Acid Phosphine JO	C	Leather
Acid Phosphine GO	Mz	Leather
Acid Phosphine BRO	Mz	Leather
Acid Ponceau	Klp	WGS
Acid Rhodamine R, 3R	Klp	WGS
Acid Rosamine A pat	Mz	WGS, SS
Acid Rubin (see Fuchsine Ex. S)		WGS, SS
Acid Rubin SB	PK	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Acid Rubine BBR	Mz	WGS
Acid Ruby	Klp	WGS
Acid Sky Blue	At	WGS
Acid Violet 2B	Kell, PK	WGS
Acid Violet 3B extra BW	By	WGS
Acid Violet bluish	Kell	WGS
Acid Violet BN, 2BN	PK	WGS
Acid Violet 4B extra	By, A	WGS
Acid Violet 4BN	Klp, PK	WGS
Acid Violet 4BS	Math	WGS, SS
Acid Violet 4BX	By	WGS
Acid Violet 5B extra	Kell	WGS
Acid Violet 5BF	Mz	WGS
Acid Violet 5BFI	Mz	WGS
Acid Violet 5BS	At	WGS
Acid Violet 5BX	Math	WGS
Acid Violet 6B	A, By, Kell, G	WGS
Acid Violet 6BC	Sch	WGS
Acid Violet 6BF	Mz	WGS
Acid Violet 6BIN	Mz	WGS
Acid Violet 6BN	Klp, PK	WGS. SS
Acid Violet 6BS	Mz	WGS
Acid Violet 7B	Mz, Klp, PK,	WGS, SS
Acid Violet 7BN	Mz	WGS
Acid Violet Double	Kell	WGS
Acid Violet N	Mz	WGS
Acid Violet R	O	WGS
Acid Violet R conc.	Mz	WGS
Acid Violet R extra	By	WGS
Acid Violet R R	Kell	WGS
Acid Violet 2R extra	By	WGS
Acid Violet 3R extra	By	WGS
Acid Violet 3RA	Mz	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Acid Violet 3RS	Mz	WGS
Acid Violet 4R	Klp, PK	WGS
Acid Violet 4RN	PK	WGS
Acid Violet 4RS	Mz	WGS
Acid Violet 6R	Sch.	WGS
Acid Violet S7B	PK	WGS
Acid Violet S4R	PK	WGS
Acid Violet VSW	O	WGS
Acid Violet ii	Mz	WGS
Acid Violet 118	HS	WGS
Acid Yellow	Mz, A, Klp, Math, O, SS,	WGS
Acid Yellow Crystals	Mz, Math	WGS
Acid Yellow AT	Math	WGS
Acid Yellow D	A	WGS
Acid Yellow G		
Acid Yellow RS	Bs	WGS
Acid Yellow S, see Naphthol Yellow	S.	
Acid Yellow 8822	H	WGS
Acme Brown	Math	CT
Acme Yellow	Mz	WGS, SS
Acridine Gold Yellow, G	Bs	CT
Acridine Orange	Mz	SA, CT
Acridine Orange G	Bs	CT
Acridine Orange NO	Mz	CT
Acridine Orange R extra	Mz	CT
Acridine Red B, 2B, 3B	Mz	CT
Acridine Scarlet R, 2R, 3R	Mz	CT
Acridine Yellow	Mz, Bs	SA, CT
Agalma Black 4B	B	WGS
Agalma Green B	B	WGS
Alcohol Blue	S, Bs, By, Mz, PK, SS	
Alcohol Blue SFC	K.	
Alcohol Eosine	tM.	

Name of Dye.	Agent or Maker.	Dye Method.
Algol Blue CF, 3G, K, 3R	By	Vat
Algol Bordeaux	By	Vat
Algol Brilliant Orange FR	By	Vat
Algol Brilliant Red 2B	By	Vat
Algol Brilliant Violet R	By	Vat
Algol Corinth	By	Vat
Algol Gray B, BB	By	Vat
Algol Dark Green B Paste	By	Vat
Algol Green B	By	Vat
Algol Olive R	By	Vat
Algol Pink R Paste	By	Vat
Algol Red B, 5G Rextra	By	Vat
Algol Scarlet G Paste	By	Vat
Algol Violet B	By	Vat
Algol Yellow, 3G, R	By	Vat
Alizadine Brown R, W, Y	H	WGSCh
Alizadine Chocolate	H	WGSCh
Alizarine Anthrol Blue NR	Mz	WCh
Alizarine Astrol B	By	WGS, WCh
Alizarine Black Bayer FB, NG, GA	By	WGSCh
Alizarine Black 4B	Math	WA
Alizarine Black 4BN	Math	WA
Alizarine Black 4BR	Math	WA
Alizarine Black 4BS	Lev	WA
Alizarine Black 6B	Math	WA
Alizarine Black CB, CT	Mz	WGSCh
Alizarine Black D	Math	WA
Alizarine Black DAC	Mz	CDv
Alizarine Black DCB	Mz	CDv
Alizarine Black DCR	Mz	CDv
Alizarine Black DE	Mz	CDv
Alizarine Black DG	Mz	CDv
Alizarine Black DHW	Mz	CDv

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Black DN	Mz	CD
Alizarine Black DPG	Mz	CDv
Alizarine Black DPR	Mz	CDv
Alizarine Black DR	Mz	CDv
Alizarine Black DRN	Mz	CD
Alizarine Black DT	Mz	CDv
Alizarine Black DYG	Mz	CDv
Alizarine Black G	Me, By	WCh
Alizarine Black P	Mz	WCh
Alizarine Black R	Bs, Math	WCh
Alizarine Black RT	Mz	CDv
Alizarine Black S	Mz, Math, PK	WCh
Alizarine Black SRA	PK	WCh
Alizarine Black SW, WB	PK	WCh
Alizarine Black T	Math	WCh
Alizarine Black TBA	A	WGSCh
Alizarine Black, WB extra, SW	B	WCh
Alizarine Black WX extra	PK	WACh
Alizarine Blue A	Mz	WCh
Alizarine Blue A B	B A Co	WCh
Alizarine Blue Black B	Mz	WCh
Alizarine Blue Black 3B, B	By	WCh
Alizarine Blue Black WB extra	B	WACh
Alizarine Blue ASR	B	WCh
Alizarine Blue BR3G	By	WCh
Alizarine Blue 9B	Mz	WCH
Alizarine Blue C G, CRR, CWRR	By	WCh
Alizarine Blue CRW	SS	WCh
Alizarine Blue CS	Math	WCh
Alizarine Blue DB	Mz	CD
Alizarine Blue DBX	Mz	CD
Alizarine Blue DE	Mz	CD
Alizarine Blue DET	Mz	CD

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Blue DG	Mz	CD
Alizarine Blue D N	Mz	WCh
Alizarine Blue D N W	Mz	WCh
Alizarine Blue D N X	Mz	WCh
Alizarine Blue DR, D2R, D4R	Mz	CD
Alizarine Blue E, A	Mz	WCh
Alizarine Blue G	Mz	WCh
Alizarine Blue G B, P L	AC	WCh
Alizarine Blue G N	Bs	WCh
Alizarine Blue G S	At	WCh
Alizarine Blue G T	Bs	WCh
Alizarine Blue GW, JR	By	WCh
Alizarine Blue J G	HS	WCh
Alizarine Blue NGG powder	PK	WCh
Alizarine Blue N S	By	WCh
Alizarine Blue O D R	At	WCh
Alizarine Blue paste	Mz	WCh
Alizarine Blue R	Mz	WCh
Alizarine Blue RR	Mz	WCh
Alizarine Blue S A P, SKY, SAE	By	WGS, WCh
Alizarine Blue S paste	PK	WCh
Alizarine Blue S powder	PK	WCh
Alizarine Blue SB powder, paste	Mz	Printing
Alizarine Blue SBW powder	Mz	WCh
Alizarine Blue SCA	Ac	WCh
Alizarine Blue SR powder, paste	Mz	Printing
Alizarine Blue S2R powder, paste	Mz	Printing
Alizarine Blue soluble powder ABS	B A Co	WCh
Alizarine Blue Black B, 3B	By	WCh
Alizarine Bordeaux B in paste	By	WCh
Alizarine Bordeaux B D in paste	By	WCh
Alizarine Bordeaux P	Mz	WCh
Alizarine Bordeaux C	Me	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Bordeaux G, GG	By	WCh
Alizarine Brilliant Green G	Math	WGS
Alizarine Brown	Mz, By, PK	WCh
Alizarine Brown AS	Klp	WCh
Alizarine Brown DB	Mz.	CD
Alizarine Brown DBD	Mz.	CD
Alizarine Brown DD	Mz	CD
Alizarine Brown, DG, D2G, D3GO, D3GI	Mz	CD
Alizarine Brown DM	Mz	CD
Alizarine Brown DR	Mz	CD
Alizarine Brown DX	Mz	CD
Alizarine Brown G	Mz	WCh
Alizarine Brown GN, AW, AT	By	WCh
Alizarine Brown O DR	At	WCh
Alizarine Brown paste	Mz	WCh
Alizarine Brown powder	Mz, By	WCh
Alizarine Brown O, F, N	Mz	WCh
Alizarine Brown R	Mz, Me, Rice	WCh
Alizarine Brown RB	By	WCh
Alizarine Brown SO	PK	WCh
Alizarine Brown Y	By	WCh
Alizarine Cardinal	By	
Alizarine Carmine	B A Co	WCh
Alizarine Carmine Blue B, G	By	WCh
Alizarine C A	B A Co	WCh
Alizarine Claret DB, DG	Mz	CD
Alizarine Claret R paste	Mz	WCh
Alizarine Coelestol R	By	WGS, WCh
Alizarine Cyanine G paste	By	WCh
Alizarine Cyanine Green 3G	By	WGSCh
Aliz. Cyanine R, 2R, 3R, RA extra	By	WCh
Alizarine Cyanole B, EF	Math	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Cyanole Violet R	Math	WGS
Alizarine Cyclamen R paste	By	Printing
Alizarine Dark Blue	PK	WCh
Alizarine Dark Blue, D, DR	Mz	CD
Alizarine Dark Blue D3R	Mz	CD
Alizarine Dark Blue S	Mz	WCh
Alizarine DG, GI	PK	WCh
Alizarine Direct Blue B, EB, E 3B	Mz	WGS
Alizarine Direct Green G	Mz	WGS
Alizarine Direct Violet R	Mz	WGS
Alizarine Emeraldole G	By	WGS
Alizarine Fast Black SP	By	WCh
Alizarine Fuchsine BD	By	WCH, WGS
Alizarine Gray SP	By	Printing
Alizarine Green paste	Pk	WCh
Alizarine Green B	Bs	WCh
Alizarine Green B	A	WA
Alizarine Green C, SS	By, Rice	WCh
Alizarine Green CE paste, CG, CK	By	WGS, WCh
Alizarine Green DW	PK	WCh
Alizarine Green EB, G	Bs	WCh
Alizarine Green F	A	WACh
Alizarine Green F powder	Sch	WCh
Alizarine Green KO	By	Sulphur
Alizarine Green S paste	Mz	WCh
Alizarine Green SE	Mz, PK	WCh
Alizarine Green S pat	Math	WCh
Alizarine Grenat R	Mz	WCh
Alizarine Indigo DO	Mz	CD
Alizarine Indigo J	By	Vat
Alizarine Indigo S paste	PK	WCh
Alizarine Irisol R	By	WGS, WCh
Alizarine Lanacyl Blue BB, 3B	Math	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Lanacyl Navy Blue B pat	Math	WA
Alizarine Lanacyl Blue R	Math	WA
Alizarine Lanacyl Violet B pat	Math	WA
Alizarine Maroon paste	PK	WCh
Alizarine Olive OD	At	WCh
Alizarine Orange A paste	PK	WCh
Alizarine Orange AO, AOP	B A Co	WCh
Alizarine Orange DF, DG, DR	Mz	CD
Alizarine Orange G	Mz, By	WCh
Alizarine Orange N, O	Mz	WCh
Alizarine Orange powder	Mz	WCh
Alizarine Orange P	Mz	WCh
Alizarine P	B A Co	WCh
Alizarine Red D4B	Mz	CD
Alizarine Red ED	Bs	WCh
Alizarine Red F paste 4F, 5F	Mz	WCh
Alizarine Red GG	PK	WCh
Alizarine Red PS	By	WCh
Alizarine Red RG	Mz	WCh
Alizarine Red RX	Mz	WCh
Alizarine Red S	Mz, PK	WCh
Alizarine Red SDG	Mz	WCh
Alizarine Red WB	By, PK	WCh
Alizarine Red WS	Mz	WCh
Alizarine Red X	Mz	WCh
Alizarine Red D1B new, D4NB	Mz	WCh
Alizarine Red No. 1 powder	Mz	WCh
Alizarine Red 2A	Mz	WCh
Alizarine Red 2ABL, BL	Mz	WCh
Alizarine Red 2 BW	Mz	WCh
Alizarine Red 1W	Mz	WCh
Alizarine Red 1Ws	Mz	WCh
Alizarine Red 2AW	Mz	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Red 2W	Mz	WCh
Alizarine Red 2WS	Mz	WCh
Alizarine Red 3GW	Mz	WCh
Alizarine Red 3W	Mz	WCh
Alizarine Red 3WS	Mz	WCh
Alizarine Red 4FW	Mz	WCh
Alizarine Red 4WS	Mz	WCh
Alizarine Red 5WS	Mz	WCh
Alizarine Rubinol R, GW, 5G	By	WGS
Alizarine Saphirol SE	By	WGS
Alizarine Saphirol B	By	WGS
Alizarine Scarlet DG, D2R	Mz	CD
Alizarine Sky Blue B	By	WGS
Alizarine Uranol	By	WGS
Alizarine Violet extra	At	WCh
Alizarine Violet G paste	Mz	WCh
Alizarine Violet N	St	WCh
Alizarine Violet B	Bs	WCh
Alizarine Violet paste	Mz	WCh
Alizarine Viridine paste FF	By	WCh
Alizarine Yellow A paste	PK	WCh
Alizarine Yellow C	Bs	WCh
Alizarine Yellow DG, DR, D3G, DOO	Mz	CD
Alizarine Yellow DR	Bs	WCh
Alizarine Yellow FS	Klp	WCh
Alizarine Yellow GG, GGW, N	Mz	WCh
Alizarine Yellow GG	A	WACh
Alizarine Yellow GG	Lev	WGS
Alizarine Yellow KS	Mz	WCh-Printing
Alizarine Yellow LW	PK	WCh
Alizarine Yellow O, paste, R, RW powder	Mz	WCh
Alkali Blue	A, Brs, Bs, By, Sch, Kell, Klp, Math, O, PK, SS.	

Name of Dye.	Agent or Maker.	Dye Method.
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 7B, BBR, R, R conc. extra	Mz.	
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 6B90 per cent., 6B, 100 per cent., R, 2R, 3R	Math.	
Alkali Blue 2B, 3B, 4B, 5B, 6B, H6B, H5BOO, H3BOO	O.	
Alkali Blue D	A.	
Alkali Blue 4B	Jb.	
Alkali Blue XG	Br. S.	
Alkali Brown	Bs	CD
Alkali Brown R	LP	CD
Alkali Fast Green B, G, 3B	By	WGS
Alkali Fast Red B, G	Mz	WGS
Alkali Green	Br. S.	
Alkali Red	Bs.	
Alkali Red B, R	Mz.	
Alkali Violet, CA	PK.	
Alkali Violet R	By.	
Alkali Yellow, R	Bs.	
Alphanol Blue BR Ex., GN, 5RN	Math	WGS
Alphanol Brown B	Math	WGS
Alpine Blue		WGS
Alsace Brown B, BB, MR, LL, R	At	CD
Alsace Gray	Fi.	
Alsace Green, J	FTM.	
Amaranth	Mz, Math	SS
Amaranth B	Math	WGS, SS
Amaranth E, O	Mz	WGS, SS
Amaranth extra	SS.	
Amine Black 4B, S4B, 6B, 10B	A	WGS
Amido Acid Black B, 4B, 6B, BL, BLG	A	WGS
Amido Azo Black B, T	Mz	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Amidoazol Cutch	H	CD
Amidoazol Drab	H	CD
Amidoazol Gray	H	CD
Amidoazol Green B	H	CD
Amido Black 10B, A, AT, E, ET	Mz	WGS
Amido Blue LE, B, GR, BA, GS, GGR	Mz	WGS
Amido Fast Black	Mz	Printing
Amido Fast Brown	Mz	Printing
Amido Naphthol Black 4Bex, 6B, S, R	Mz	WGS
Amido Naphthol Red 2B, 6B, G	Mz	WGS
Aminogene Blue R		
Aminogene Violet R		
Anil Blue R	K.	
Aniline Brown	Fi.	
Aniline Green	Math	WGS, CT
Aniline Orange	Math	CT
Aniline Yellow	Bt	WGS, SS, CT
Aniline Yellow extra	Klp.	
Aniline Yellow NT	Math	CD
Anisoline	Math	CD
Anisol Red	Mo	WGS, SS, CD
Anthra Alizarine Bordeaux	At	WACh
Anthra Alizarine Carmoisine	At	WACh
Anthra Alizarine Green CG	At	WACh
Anthra Alizarine Red B	At	WACh
Anthra Alizarine Yellow G	At	WACh
Anthracene Acid Black C	Klp	WCh
Anthracene Acid Black LW, SF, ST, SW	Math	WGSCh
Anthracene Acid Blue 2G, 2R	C	WGSCh
Anthracene Acid Brown B, G, N, R, SW pat, V	Math	WGS, WCh, SA
Anthracene Black		

Name of Dye.	Agent or Maker.	Dye Method.
Anthracene Blue C	Math	WCh
Anthracene Blue S, SWX, WB, WG, WR, SWGG extra	PK	WCh
Anthracene Blue Black C	Math	WGSCh
Anthracene Brown paste	Ba, Co, By	WCh
Anthracene Brown G paste, R paste	By	WCh
Anthracene Brown O paste	Mz	WCh
Anthracene Brown RR	Bs	CDv
Anthracene Chromate Brown EB, ER, WG, WS	Math	Special
Anthracene Chromate Gray C	Math	Special
Anthracene Chrome Black, F, 5B, FE, PFB ext.	Math	WGSCh
Anthracene Chrome Blue BB, F, G, FR	Math	WGSCh
Anthracene Chrome Blue BST, BWext, RST, RWext, RRWext	Math	WGSCh
Anthracene Chrome Blue D, RB	D	WACh
Anthracene Chrome Brown, D SWN	Math	WCh
Anthracene Chrome Green	Math	WCh
Anthracene Chrome Red, A	Math	WCh
Anthracene Chrome Violet, BR	Math	WCh
Anthracene Croceine B, G	F	WCh
Anthracene Dark Blue	PK	WCh
Anthracene Green, or Coeruleine		WCh
Anthracene Orange G	Math	WCh
Anthracene Red	By, I, Klp	WGS
Anthracene Red B	HS	WGS
Anthracene Scarlet OR	HS	WGS
Anthracene Yellow paste	By	WCh
Anthracene Yellow BN, C, GG, R	Math	WGS, WCh
Anthracene Yellow GN	Bs	WCh
Anthracite Black BR	Math	WGS
Anthrachrome Blue Black C	L	WACh

Name of Dye.	Agent or Maker.	Dye Method.
Anthrachrome Brown W, WA, WGG, WS	L	WACh
Anthrachrome Green B, G, GG	L	WACh
Anthrachrome Violet R	L	WACh
Anthracyanine BL, DL, FL, 3FL, RL, 4RL	By	WGS, WCh
Anthracyanine Brown GL, RL	By	WGS
Anthracyanine Green BL, 3GL	By	WGS
Anthracyanine Violet 3B	By	WGS
Anthracyl Chrome Brown D	D	WACh
Anthracyl Chrome Gray	D	WACh
Anthracyl Chrome Green A, D	D	WACh
Anthracyl Chrome Olive	D	WACh
Anthraflavone	B	Vat
Anthragallol, or Anthracene Brown	Math	WCh
Anthramine Yellow	At	WCh
Anthraquinone Blue SR	PK	WGSCh
Anthraquinone Green G, Gex	B	WGS, WGSCh
Anthraquinone Violet	PK	WGS
Anthrol Blue NR paste	Mz	WCh
Apollo Red	Kell	WGS
Arabian Black	Bai	CD
Archil Red 3 VN	P	WGS
Archil Substitute N powder	Math	WGS
Archil Substitute G powder	Mz	WGS
Archil Extract, 1, 2, 3, 4	Math	WGS
Archil Extract extra and conc	Mz	WGS
Arnica Yellow	Kell	CD
Atlanta Yellow 103	HS	CD
Atlas Orange	BrS	WGS, SS
Atlas Red	BrS	WGS, SS
Atlas Scarlet	By	WGS
Auracine G	By	CT
Auramine G	G, Klp, PK	WG, CT

Name of Dye.	Agent or Maker.	Dye Method.
Auramine O, 1 II, conc	G. Klp, Mz, PK, WG, CT	
Aurantia	A	SS
Aureoline	Klp	CD
Aureosine		
Aurine	Gr, Lo, LP, Mo, RD.	
Auronal Black, NG, NV, D, 3G, N5G, N2R	tM	Sulphur
Auronal Brown GG	tM	Sulphur
Aurophenine	Mz	CD
Aurophosphine G	A	SA
Aurotine	ClCo.	
Autogene Black	SS	Sulphur
Autogene Brown BG	SS	Sulphur
Autogene Gray	SS	Sulphur
Azaleine		
Azarin R, S	Mz	Lakes
Azidine Black BHN	CJ	CDv
Azidine Blue 2B, 3B, 3RN	CJ	CD
Azidine Bordeaux	CJ	CD
Azidine Brown M, TRR	CJ	CD
Azidine Dark Brown B	CJ	CD
Azidine Green GG	CJ	CD
Azidine Orange G, R	CJ	CD
Azidine Pure Blue FF	CJ	CD
Azidine Purpurine 10B, 12B	CJ	CD
Azidine Violet R	CJ	CD
Azidine Yellow G, R	CJ	CD
Azin Blue, alcohol soluble	Bs.	
Azindon Blue G, R	Mz	CT
Azin Green GO, BO, TO	Mz	WGS, CT
Azin Scarlet G conc. GO	Mz	WG, SA, CT
Azo Acid Black B, BL, G, GL, 3BL, R, TL, extra conc., TL, No. 2 extra SS, SS conc.	Mz	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Azo Acid Blue B, 3B conc., 3BO	Mz	WGS
Azo Acid Brown	By	WGS
Azo Acid Carmine B	Mz	WGS
Azo Acid Fuchsine B, G	Mz	WGS
Azo Acid Magenta B, G, B conc., G conc.	Mz	WGS
Azo Acid Red B, BA, 5B	Mz	WGS
Azo Acid Ruby, 2B	Bs	WGS
Azo Acid Violet AL, A2B	By	WGS
Azo Acid Violet 4R R extra	By	WGS
Azo Acid Yellow	A, NYB	WGS
Azo Alizarine Black	DH	WCh
Azo Alizarine Bordeaux	DH	WCh
Azo Alizarine Yellow CG	DH	Printing
Azo Archil R	A	WGS
Azo Benzol Fast Crimson	B	WGS
Azo Black O	Mz	WGS, SS
Azo Black Blue	O	CD
Azo Blue	Mz, By, A	CD
Azo Bordeaux	Sch, By, O	WGS
Azo Brown N	Bs, Math	WGS
Azo Brown O	Mz	WGS
Azo Brown V	Mz	WGS
Azo Brown Y	P	WGS
Azo Carmine G paste, B	PK	WGS
Azo Carmine G	A	WGS
Azo Cardinal G	A	WGS
Azo Chrome Blue T, TB	C	WGSCh
Azo Chromine	Kell	WGS
Azo Coccine 7B, or Cloth Red	A	WGS
Azo Coccine G, or Tropaeoline 0000		WGS
Azo Coccine 2R	A	WGS
Azo Cochineal	By	WGS
Azo Coralline	Bs	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Azo Corinth	O.	
Azo Crimson L, S	By	WGS
Azo Dark Blue	O	CD
Azo Eosine	By	WGS
Azo Fast Blue B, BD, BS, BR	Math	WGS
Azo Flavine	Bs, PK	WGS, SS
Azo Fuchsine B, G, GN, S	By	WGS
Azo Galleine	Kell	WCh
Azo Green	By	WCh
Azo Grenadine S	By	WGS
Azo Mauve B, R	O	CD
Azo Merino Black B, 6B	C	WGS
Azo Merino Blue 3B, G	Math	WGS
Azo Merino Dark Blue R	Math	WGS
Azo Navy Blue B, 3B	Math	WGS
Azomine Black	UI	CD
Azomine Yellow	UI	CD
Azo Orange NA	Mz	Printing
Azo Orange Yellow NA	Mz	Printing
Azo Orange R	Klp	CD
Azo Orseille BB	Math	WGS
Azo Orseille R	A.	
Azo Orseilline	A, By, O, PK.	
Azo Patent Black 3BK, 4BK, 3BKN, TK	K	WGS
Azophenine Blue R	Grie	CT
Azophloxine 2G	By	WGS
Azophone Black	At	CD
Azophone Green B, G	At	CD
Azophor Black S, DP	Mz	Printing
Azophor Blue D	Mz	Printing
Azophor Orange MN	Mz	Printing
Azophor Orange	Mz	Printing

Name of Dye.	Agent or Maker.	Dye Method.
Azophor Pink A, Base	Mz	Printing
Azophor Red PN	Mz	Printing
Azo Pink BB, NA	Mz	Printing
Azo Red B, BB, G	Bs	WGS
Azo Rubine	O, Sch	WGS
Azo Rubine	O	WGS
Azo Rubine A	Math	WGS
Azo Rubine SG	A	WGS
Azo Ruby	tM, Lev	WGS
Azo Ruby S, 2S	A	WGS
Azo Saffranine	Kell	WGS
Azo Turkey Red	O.	
Azo Violet	Mz, A, By, Lev	CD
Azo Wool Blue B, SE	Math	WGS
Azo Wool Violet 4B, 7R	Math	WGS
Azo Yellow	Bt, K, Mz, Klp, O, SS	WGS, SS
Azo Yellow conc.	Mz	WGS
Azo Yellow M	Klp	WGS, SS
Azo Yellow N, NR	Kell	SS
Azo Yellow OR	Mz	WGS, SS
Basel Blue, BB, R paste, S	Klp	WG, CT
Bavarian Blue alcohol soluble	A.	
Bavarian Blue DBF, DSF	A	SA, CT
Belgium Blue	AC.	
Bengal Blue	K.	
Bengal Deep Black D, 2B	SS	CDv
Bengal Pink	Klp	WGS
Benzaline Blue B	K	CT
Benzal Green, O powder, OO crystals	O	WN, CT
Benzindamine	NI.	
Benzo Azurine G, 3G	Mz, A, By	CD
Benzo Azurine R, 3R	Mz, By	CD

Name of Dye.	Agent or Maker.	Dye Method.
Benzo Black HW	Mz, By	CD
Benzo Black Blue G, 5G, R	Mz, By	CD
Benzo Black Brown	By	CD
Benzo Blue BB, 3B, BX	By	CD
Benzo Bordeaux 6B	By	CD
Benzo Brown G, 5R, RC, NB, GG, MC, 3GG	By	CD
Benzo Chrome Black B	By	CD
Benzo Chrome Black Blue, B	By	CD
Benzo Chrome Brown B, BS, 5G, R, 3R	By	CD
Benzo Copper Blue B, 2B	By	CD
Benzo Cyanine B, 3B, R	By	CD
Benzo Dark Brown	By	
Benzo Dark Green B, BB, GG	By	CD
Benzo Fast Black 3B, G	By	CD
Benzo Fast Blue B, Bn G, 5R	By	CD
Benzo Fast Gray	By	CD
Benzo Fast Orange S, 2RL, WS	By	CD
Benzo Fast Pink 2BL	By	CD
Benzo Fast Red L, GL, FC, 9BL	By	CD
Benzo Fast Scarlet 4BS, 8BS, 5BS, 7BS	By	CD
Benzo Fast Violet R, N, NC	By	CD
Benzo Fast Yellow 5GL, 4GLex, RL	By	CD
Benzo Flavine O. No. 2	O	CT
Benzo Gray	By	CD
Benzo Green G, C, FF	By	CD
Benzo Indigo Blue	By	CD
Benzo Light Red 8BL	By	CD
Benzo Light Rubine BL	By	CD
Benzoin Yellow	B	WCh
Benzo New Blue BX, 5B, 2B	By	CD
Benzo Nitrol Brown G, N, 2R	By	CD
Benzo Nitrol Bordeaux G	By	CDv

Name of Dye.	Agent or Maker.	Dye Method.
Benzo Olive extra	By	CD
Benzo Orange R	A, By	CD
Benzopurpurine B, 4B, 6B, 10B	Mz, By, A	CD
Benzopurpurine 4Bex conc.	Mz	CD
Benzopurpurine 4B double	Mz	CD
Benzo Red SG, 10B, 12B	By	CD
Benzo Rhodamine 3B	By	CD
Benzo Rhoduline Red B, 3B	By	CD
Benzo Rubine SC	By	CD
Benzo Sky Blue	Mz, By, A	CD
Benzo Steel Blue G extra	By	CD
Benzo Violet RL extra	By	CD
Benzyl Acid Black BB	Klp	WGS
Benzyl Black B, 4B	Klp	WGS
Benzyl Blue S	Klp	WGS
Benzyl Bordeaux, B	Klp	WGS
Benzyl Blue S	Klp	WGS
Benzyl Green G, B	Klp	WGS
Benzyl Violet 4B, 10B, 5B, 5BN	Klp	WGS
Benzyl Violet, 4B	Bt, CR, RE, tM,	WGS, SS, CT
Berlin Blue A	A	WGS
Best Magenta Crystals	Bt.	
Best Violet, or Brilliant India Dye	Bt.	
Bichromine Blue AB, G	D	WCh
Biebrich Acid Black ST	K	WGS
Biebrich Acid Blue, G, GG	K	WGS
Biebrich Acid Red B, 4B, 3G, 5B	K	WGS
Biebrich Acid Violet 2B, 6B	K	WGS
Biebrich Alizarine Black 4BN	K	WGS
Biebrich Patent Black AN, 4AN, AO 4BN, RO, 4B, B	K	WGS
Biebrich Patent Jet Black, 3BO	K	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Biebrich Scarlet	K	WGS
Bismarck Brown	A, CR, F, K, Math, NI, Lh, O, PK, HM	CT
Bismarck Brown B	Klp	CT
Bismarck Brown EE	Math	CT
Bismarck Brown FFG	Math	CT
Bismarck Brown G	Klp	CT
Bismarck Brown GG	Math, O	CT
Bismarck Brown GOO, GOOO	O	CT
Bismarck Brown R, Y Rex	Mz	CT
Bismarck Brown ROO, ROOO	O	CT
Bismarck Brown T	Klp	CT
Bismarck Brown YS 8049	Math	CT
Bistramine Brown G	By	Special
Bitter Almond Oil Green	Bt	WGS, SS, CT
Black Black O	Mz	WGS, SS
Black Blue O	Mz	WGS, SS
Black Soluble in Oil	Mz, Math.	
Blackley Blue	Lev	SS, CT
Blue Asozin	P	WGS
Blue Alcohol Soluble	Mz.	
Blue B, BB	Mz	Printing
Blue BJB	P	WGS
Blue Black B	PK	WGS
Blue Black GR, 5G	Klp	WGS
Blue Black, Diphenyl	Kell	CD
Blue BS	Math, P	WGS
Blue 3BS	P	WGS
Blue BW	O.	
Blue CB, alcohol and water soluble	Klp.	
Blue extra	RD	CT
Blue for Silk	Math.	
Blue for printing, paste and powder	Mz.	

Name of Dye.	Agent or Maker.	Dye Method.
Blue for white	Kell	SS
Blue G	Jy	CT
Blue, green shade	Mz	WGS, SS, CT
Blue Green S	PK.	
Blue R	Mz	Printing
Blue, red shade	Mz	WGS, SS, CT
Blue T conc.	Mz	WGS, SS
Blue 2111	At	CD
Blue Black 5534	H	WGS
Body Blue O	Mz	WGS, SS, CT
Bordeaux B	Mz, A, Math,	LPRF
Bordeaux BL	Math	WGS, SS
Bordeaux BX	By	WGS
Bordeaux COV	A	CD
Bordeaux DH	Klp	WGS
Bordeaux Diamine B, S	Math	CD
Bordeaux extra	By	WGS
Bordeaux G	Bs, By	WGS
Bordeaux R extra	Mz	WGS
Bordeaux S	A, RF	WGS
Bottle Green	Bch.	
Brahma Orange	Z.	
Brahma Red B, BB, 6B	Z.	
Braxeline	At.	
Bright Blue extra	Mz	CD
Bright Blue O	BL	CD
Bright Yellow T	Mz, PK	CD
Brilliant Acid Blue B	By	WGS
Brilliant Acid Carmine 6B	O	WGS
Brilliant Acid Green 6B	By	WGS
Brilliant Alizarine RR, 5R	By	CD
Brilliant Alizarine Blue D, G, R, 3R powder	By	WCh

Name of Dye.	Agent or Maker.	Dye Method
Brilliant Alizarine Blue EM	Mz	WCh
Brilliant Alizarine Bordeaux R	By	WCh
Brilliant Alizarine Cyanine G, 3G	By	WCh
Brilliant Alizarine Viridine F	By	WCh
Brilliant Anthrazol	B	WGS
Brilliant Azurine B, R	A, By	CD
Brilliant Azurine 5G	Mz, A, By	CD
Brilliant Benzo Fast Violet BL, 2RL	By	CD
Brilliant Benzo Green B	By	CD
Brilliant Black B	PK	WGS
Brilliant Black Solution BE, NE, RE	Math.	
Brilliant Blue	Bs.	
Brilliant Blue 7B	O.	
Brilliant Blue HB	Gt	WGS
Brilliant Bordeaux S	A	WGS
Brilliant Carmine	NYB	SS
Brilliant Carmine Green	Lev	WGS
Brilliant Carmoisine O	A	WGS
Brilliant Cochineal 2R, 4R	Math	WG
Brilliant Chrome Red, paste	By.	
Brilliant Chrome Scarlet BD Paste		
Brilliant Cloth Blue Bex, G	K	WAS
Brilliant Congo G, R	Mz, A, By	CD
Brilliant Congo Blue B, BFL, 5R, 2RW	A	CD
Brilliant Copper Blue BW, RW	A	CDv
Brilliant Cotton Blue B57	Sch	CAl
Brilliant Cotton Blue, greenish	By	CT
Brilliant Cresyl Blue 2B	L	CT
Brilliant Crimson B, O, N	Mz	WGS, CT
Brilliant Crocein blue, and yellow	Mz	WGS, SS, CAl
Brilliant Croceine AZ	Math	WGS
Brilliant Crocein B, BB	Mz	WGS, SS
Brilliant Croceine 3B	Mz, By, Math.	WGS, SS

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Croceine BOO	Math	WGS
Brilliant Croceine 5B	Mz, Math	WGS, SS
Brilliant Croceine 6B, 7B, 9B, 10B	Math	WGS
Brilliant Croceine D	Mz	WGS
Brilliant Croceine M, MOO	Math	WGS
Brilliant Croceine MOO	NYB	SS
Brilliant Croceine R	Mz, Math	WGS
Brilliant Croceine ROO	Math	WGS
Brilliant Croceine Scarlet D	Mz	WGS
Brilliant Cyanine Blue R	By	WCh
Brilliant Dianil Red R, R Conc.	Mz	CD
Brilliant Diazine Blue B, B	K.	
Brilliant Direct Navy Blue B	Bs	CD
Brilliant Direct Red 249	Sch	CD
Brilliant Fast Blue B, 2G, 4G, 3BX	By	CD
Brilliant Fast Red P	By	Paper
Brilliant Firn Blue	Klp	CT
Brilliant Geranine B, 3B	By	CD
Brilliant Green	Mz, By, CJ, CR, F, K, Klp, Math, PK, NI, O, PS, RE, tM, Bt,	WN, SS, CT
Brilliant Green crystals, B, C	Mz	WN, CT
Brilliant Green crystals extra, extra N, powder superior, ia, No. 12	Mz	WN, SA, CT
Brilliant Green O crystals	O	WN, CT
Brilliant Indigo Carmine sub	Lev	WGS
Brilliant Lake Red R	Mz	Lakes
Brilliant Lake Scarlet G, R, 2R	Mz	WGS, SS
Brilliant Lanafuchsine SL, GG	Math	WGS
Brilliant Milling Blue B	C	WGSCh
Brilliant Milling Green B, S	C	WGS
Brilliant Milling Scarlet 2B	Lev	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Naphthol Blue B, R	C	WGS
Brilliant Opaline	Gb.	
Brilliant Orange G	Mz, A	WGS, SS
Brilliant Orange O, R	Mz	WGS, SS
Brilliant Orcelleine, pat	Math	WGS
Brilliant Orseille C	Math	WGS
Brilliant Patent Blue A, AG, AR, A2R	Mz	WGS
Brilliant Ponceau G, GG	Math	WGS
Brilliant Ponceau 4R	By	WGS
Brilliant Ponceau 5R	Bs, By, Math	WGS
Brilliant Purpurine 10B	A	CD
Brilliant Purpurine R	Mz, A, By	CD
Brilliant Purpurine 4R	RF	CD
Brilliant Purpurine 5B	RF	CD
Brilliant Red	Sch	WGS
Brilliant Red D	Klp	WGS
Brilliant Red Congo G	Mz, A, By	CT
Brilliant Rhoduline Violet R	By	CT
Brilliant Rubine O	Mz	WGS, SS
Brilliant Safranine G	A	WGS, CT
Brilliant Scarlet	Lev.	
Brilliant Scarlet G, GG, R, RR, 3R, 4R, 6R, T	Math	WGS
Brilliant Scarletine	H	WGS
Brilliant Scarlet N3R	SS	WGS
Brilliant Sky Blue G	Bs	CD
Brilliant Sky Blue G, 5G	By	CD
Brilliant Sulphon Azurine R	By	
Brilliant Sulphon Red B	By	WGA
Brilliant Wool Blue B extra, G extra	By	SS, WGS
Brilliant Yellow	Mz, A, By, SB, SCH, tM	WGS, SS
Brilliant Yellow I	H	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Yellow S	PK	WGS, SS
Bromofluoresceic Acid Crystals	Mz	Lakes
Bromofluoresceic Acid AG, A3G, A6G	Mz	Lakes
Bromofluoresceic Acid AL	Mz	Lakes
Bromofluoresceic Acid BA, conc.	Mz	Lakes
Bromofluoresceic Acid BL Blue	Mz	Lakes
Bromofluoresceic Acid BL Yellow	Mz	Lakes
Bronze Blue J	PK	
Bronze Diamine G	Math	CD
Brown BBX	BrS	CD
Brown JE, JEEE	P	WGS
Brown M	P	WGS
Brown N	P	WGS
Brown SDM, SDP	SS	CD
Brown for Leather O	Mz	Tannin
Buffalo Black 4B, 8B	Sch	WGS
Buffalo Brown R	Sch	CT
Buffalo Bordeaux	Sch	CD
Buffalo Chrome Black	Sch	WGSCh
Buffalo Crimson B	Sch	CD
Buffalo Rubine	Sch	CD
Buffalo Scarlet 4B	Sch	CD
Buffalo Thiol Black GB	Sch	Sulphur
Buffalo Violet 4R	Sch	CD
Butter Yellow	HM	
Cachou de Laval S	P	Sulphur
Cachou Diamine	Math	CD
Calcutta Black 3B, 3G	H.	
Calico Yellow, GG, 3G, 4G	Kell	Printing
Campanuline	A	CD
Canarine	Klp.	
Capri Blue GN	Mz, Bs	CT
Capri Green B, G, GG	Mz	CT

Name of Dye.	Agent or Maker.	Dye Method.
Carbazol Yellow W	PK	CD
Carbide Black, BO, R, RO, E, ER Rex, S, SE, SO	Klp	CD
Carbogen B, T	Mz	WGSCh
Carbon Black B, BD, BW, 4B, GAT	Mz	WGS
Carbon Black BW	K	CD
Cardinal	Mz	WG, SA, CT
Carminogen BB	Mz	Lakes
Carmoisine	A, By, PK, SS	WGS
Carmoisine conc.	Mz, A, K, SS	WGS
Carnotine	ClCo	CD
Caroubier	Klp.	
Cashmere Black B, 6B, T	By	WGS
Cashmere Blue TG	By	WGS
Cashmere Brown V	By	WGS
Cashmere Green B	By	WGS
Cerasine	Klp.	
Cerasine Blue LC	Math.	
Cerasine Orange G	Math.	
Cerasine Red, A	Math.	
Cerasine Yellow, GT	Math.	
Cerise	Mz, Bt, Klp, Math, NI, PK, PS, SS,	WG, SA, CT
Cerotine Orange C, extra	O	WGS
Cerotine Colors	CJ	Oil Soluble
Chestnut Brown	A	CD
Chicago Blue B, 4B, 6B, R, 2R, 4R, RW	A	CD
Chicago Gray	Kell	CD
Chicago Orange, G, extra, 3G	Kell	CD
China Blue	Mz, A, BrS, By, PN,	WGS, SS, CT
China Blue R, No. 1, 2	Math.	

Name of Dye.	Agent or Maker.	Dye Method
China Blue 71115	KB.	
China Green crystals	Kell.	
Chinoline Blue	PK.	
Chinoline Green	A.	
Chinoline Red	A.	
Chinoline Yellow	Mz, BrS, By, PK, WGS	
Chinoline Yellow ext. conc.	Mz	WGS
Chinoline Yellow N extra	By	WGS
Chloramine Blue 6B	S	CD
Chloramine Brown C, G	By	CD
Chloramine Orange G	By	CD
Chloramine Red 8BS	By	CD
Chloramine Violet	By	CD
Chloramine Yellow GG, C, FF, Wex, RC.	By	CD
Chloranisidine	B	Lakes
Chlorantine Blue 2B	Klp	CD
Chlorantine Lilac	Klp, PK	CD
Chlorantine Red 8B	Klp	CD
Chlorantine Violet B, R	Klp	CD
Chlorazol Blue 6G, R, 2R, 6B	H	CD
Chlorazol Brilliant Blue 88B, 10B, 12B, R	H	CD
Chlorazol Brilliant Green B, G	H	CD
Chlorazol Brown A, B, C, R, M	H	CD
Chlorazol Fast Yellow A	H	CD
Chlorazol Green B, Y	H	CD
Chlorazol Heliotrope	H	CD
Chlorazol Yellow G, 3G, Y	H	CD
Chlorine Blue R	Klp	CT
Chlorine Blue T	Mz	Special
Chlorophenine G, O, R, Y	ClCo	CD
Chlorophenine Orange, AA, R	ClCo	CD
Chromal Blue G conc.		

Name of Dye.	Agent or Maker.	Dye Method.
Chromanil Black RF, BF, 2BF, 3BF	A	CD
Chromanil Brown GG, R, 2G	A	CD
Chromate Black 6B, TB4B	A	WGSCh
Chromate Fast Brown D, RG, 3G	A	WGSCh
Chromazine Violet	Sch	WCh
Chromazo Maroon	Sch	WCh
Chromazo Red RB	Sch	WCh
Chromazo Yellow GR	Sch	WCh
Chromazon Blue B, R	Kell	WGS
Chromazon Red	Kell	WGS
Chrome Azurine S	S	WCh
Chrome Black	Jy, SW	WGS
Chrome Black, B, T	Mz	WGSCh
Chrome Blue	Jy, By, Math	WCh
Chrome Blue B	Mz	WCh
Chrome Blue 2B, 4B, BN, PE, R, 2R, 3R, No. 470	Kell	WCh
Chrome Blue F	C	Printing
Chrome Bordeaux	By	WCh
Chrome Brown G	Kell	WCh
Chrome Brown BO, RO	Mz	WCh
Chrome Cyanine G, T	By	WACh
Chrome Fast Black B, F	A	WCh
Chrome Fast Black F, P, PWWR	Klp	WGSCh
Chrome Fast Blue B	Klp	WGSCh
Chrome Fast Blue B, 4B	A	WGSCh
Chrome Fast Blue FR	C	Printing
Chrome Fast Brown A, BC, G, R, V, TV	Klp	WGSCh
Chrome Fast Cyanine B	Klp	WGSCh
Chrome Fast Green G	Klp	WGSCh
Chrome Fast Red B, GR	A	WGSCh
Chrome Fast Yellow G, 2G, R, 2R	A	WCh
Chrome Green	By	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Chrome Leather Black BC	Math.	
Chrome Orange	By	WCh
Chrome Patent Black TB, TG, TR, T	K	WGSCh
Chrome Patent Green A, N	K	WGSCh
Chrome Prune	By	WCh
Chrome Red R	HS	WCh
Chrome Red paste	By	WCh
Chrome Ruby paste	By	WCh
Chrome Violet powder	By, Kell	WCh
Chrome Violet paste	By	WCh
Chrome Violet M	C	Printing
Chrome Yellow	H S, N I	WCh
Chrome Yellow D	By	WCh
Chrome Yellow G	By, HS	WCh
Chrome Yellow P	Kell	WCh
Chrome Yellow R	SS	WACh
Chromindigene	Mz	Printing
Chromine G	K	WCh
Chromine Blue B, T	HS	WCh
Chromium Patent Black DG, DGG	K	WGSCh
Chromocyanine	DH	Printing
Chromoglaucine VM paste	Mz	Printing
Chromogen I	Mz	WGSCh
Chromotrop 2B, 6B, 8B, 10B, 2R	Mz	WGS
Chromotrop DW, FB, S, SB, SN, SR, F4B	Mz	WGSCh
Chromotrop Blue A, WB, WG	Mz	WGSCh
Chromoxal Green B		
Chromoxane Blue R	By	WACh
Chromoxane Green FF	By	WACh
Chromoxane Violet B, R	By	WACh
Chrysamine	By	CD
Chrysamine G	Mz, A, By	CD
Chrysamine GG	By	CD

Name of Dye.	Agent or Maker.	Dye Method.
Chrysamine R	Mz, A, By	CD
Chrysaniline		
Chrysoidine	Mz, A, By, K, PK, Lh,	WN, SA, CT
Chrysoidine AG, FF	Math	WN, SA, CT
Chrysoidine G	Kell, Klp,	WN, SA, CT
Chrysoidine R	Mz Kell, Klp, Math, HM,	WN, SA, CT
Chrysoidine Y, YY	Mz, Sch, Math, HM,	WN, SA, CT
Chrysoidine Brown	Math	WN, SA, CT
Chrysoine	Klp, Mz, PK, SS,	tM
Chrysoline	Kell	WGS
Chrysophenine R	Mz, A, By	CD
Chrysophenine conc., ext. conc.	Mz	CD
Chrysophenine G	Mz	CD
Ciba Blue B, 2B	I	Vat
Ciba Green G	I	Vat
Ciba Gray B, G	I	Vat
Ciba Orange G	I	Vat
Ciba Red G, R	I	Vat
Ciba Scarlet	I	Vat
Ciba Violet B	I	Vat
Cibanone Black B	I	Vat
Cibanone Brown B	I	Vat
Cibanone Orange R	I	Vat
Cibanone Yellow R	I	Vat
Cinereine	SS.	
Cinnabar Scarlet	BK.	
Cinnamine S	W.	
Cinnamon Brown	PS	WGS, CT
Citronine	Mz, BrS, Fi, Klp, O, SS	WGS, SS
Citronine A	Mz	WGS, SS

Name of Dye.	Agent or Maker.	Dye Method.
Citronine AA, 2A, extra, AHE NE	SS	SA
Citronine G, GOO, GOOO	O.	
Citronine NE	SS	SA
Citronine Diphenyl G	Kell	CD
Citronine Diphenyl GOO	O	SS
Claret Red	Sch	WGS
Claret Red B, 3B, G, GR, R, B extra O, S	Mz	WGS
Claret Red for Lake B	Mz	Lakes
Clayton Aurotine	ClCo.	
Clayton Carnotine	ClCo	WGS
Clayton Cloth Red	ClCo	WGS
Clayton Fast Gray D	ClCo	Sulphur
Clayton Fast Black	ClCo	Sulphur
Clayton Red	ClCo.	
Clayton Yellow, G	ClCo	CD
Clematine	Kell	CT
Cloth Blue O	Mz	WGS, SS, CT
Cloth Blue S	L	WGS
Cloth Brown reddish, yellowish	Mz, By	WCh
Cloth Orange	Mz, By	WCh
Cloth Red	Mz	WCh
Cloth Red, see Stanley Red	ClCo.	
Cloth Red B	Mz, Bs, By, O	WCh
Cloth Red BA	A	WCh
Cloth Red 3B extra	By	WCh
Cloth Red BO, FRBO	O	WCh
Cloth Red G	Mz, By, O	WCh
Cloth Red G extra, 3G extra	By	WCh
Cloth Red GA, 3GA	A	WCh
Cloth Red GO, 3GO	O	WCh
Cloth Red O	Mz	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Cloth Red OB	O	WCh
Cloth Red R	Bs	WCh
Cloth Scarlet G, R	K	WGS
Cloth Yellow G, R, GN	O	WGSCh
Coccein 3B	SS	WGS
Coccine 2B	A	WGS
Coccinin, B	Mz	WGS
Cochineal Red A	PK	WGS
Cochineal Scarlet G	Sch	WGS
Cochineal Scarlet PS	By	WGS
Cochineal Scarlet 2R, 4R	Sch	WGS
Cochineal Substitute	Klp	WGS
Coelestine Blue B	By	CT
Coeruleine A, B, S BWR	Mz	WCh
Coeruleine S powder or paste	Mz, By, Klp, PK	WCh
Coeruleine SW, powder or paste	Mz, By	WCh
Cold Black, BR	A	CD
Columbia Black B, BB, FB, R, FF	A	CD
Columbia Black FF extra, FB strong, F2B, 2BX, 2BW, EA extra, WA extra	A	CD
Columbia Black Blue G	A	CD
Columbia Black Green D	A	CD
Columbia Blue G, R	A	CD
Columbia Bordeaux B	A	CD
Columbia Brown R, M	A	CD
Columbia Chrome Black BB	A	CD
Columbia Fast Black V extra, G extra Rex	A	CD
Columbia Fast Blue 2G	A	CD
Columbia Fast Red F	A	CD
Columbia Fast Scarlet 4B	A	CD
Columbia Green 3B, G, N	A	CD
Columbia Orange R	A	CD

Name of Dye.	Agent or Maker.	Dye Method.
Columbia Red 8B, 6B, 4B, 2B	A	CD
Columbia Violet R	A	CD
Columbia Yellow	A	CD
Concentrated Cotton Blue R, 2R, 1, 2, 3, 4, B	Mz	WGS, SS, CAl
Congo	Mz, A, By	WN, CD
Congo B	SS.	
Congo BB	A, By	CD
Congo GR	A, By	CD
Congo Blue BX, R, 2B, 3B, 2BX	A	CD
Congo Brown G, R	A	CD
Congo Corinth B, G	A, By	CD
Congo Fast Blue B, R	A	CD
Congo GR	A, By	CD
Congo Orange G	A	CD
Congo Orange R	Mz, A, By	CD
Congo P, Pure Blue	A	CD
Congo 4R	Mz, A, By	CD
Congo Red	Mz, Sch, Klp, By, A	CD
Congo Rubine	Mz, A	CD
Congo Violet	A	CD
Congress Red FEN	NI	CD
Coomassie Black B	Lev	CWD
Coomassie Blue	Lev	CWD
Coomassie Violet	NS	WGS
Coomassie Wool Black BA, conc., R, S	Lev	WGS
Copper Black S	Mz	WGS, Dev
Copper Blue B, B extra	Mz	WGS, Dev
Copper Red		WGS, Dev
Coralline	LP.	
Coreine, AB, AR, RR	Klp	WCh
Corvan Black	B	WGSCh

Name of Dye.	Agent or Maker.	Dye Method.
Cotton Black B, 3B	PK	CD
Cotton Blue	Mz, Bs	CAl
Cotton Blue BI	HS	WGS, CAl
Cotton Blue 3B, 6B extra	Mz, O	WGS, SS, CT
Cotton Blue O	Kell.	
Cotton Blue OO extra	O	CT
Cotton Blue R	PK, SS	CT
Cotton Bordeaux	PK	CD
Cotton Brown	PK	CD
Cotton Brown 3G, R	ClCo	CD
Cotton Brown N	Math	CD
Cotton Brown R, G	PK	CD
Cotton Dark Brown B	AC	CD
Cotton Green CG	A	CD
Cotton Navy Blue CR	AC	CD
Cotton Orange G, R	PK	CD
Cotton Ponceau	BK.	
Cotton Red, 4B	PK	CD
Cotton Rhodanine	BCF	CT
Cotton Scarlet	PK	CAl
Cotton Scarlet 3B	Sch, K	CAl
Cotton Scarlet O	Mz	WN, SA, CT
Cotton Scarlet, yellowish	Math	SA, CT
Cotton Yellow G, R	Kell	CD
Cotton Yellow G, GB, R	PK	CD
Cresotine Yellow G, R	Mz, A, By, O	CD
Cresyl Blue BB, 6B, BBSO, RR	Bs	CT
Cresyl Fast Violet B, BB	Bs	CT
Cresyl Green GG	Bs	CT
Cresyl Violet BB	Bs	CT
Criterion Blue G	At	WGS
Croceine AZ, X	Math.	

Name of Dye.	Agent or Maker.	Dye Method.
Croceine B, 3B	Sch	WGS, SS
Croceine 3BX	By, K	WGS
Croceine Orange	By, K	WGS
Croceine Scarlet 3B	Sch, By, K	WGS, CD
Croceine Scarlet 4BX	K	WGS
Croceine Scarlet 7B	By	WGS
Croceine Scarlet 8B	By, K	WGS
Croceine Scarlet 10B	By	WGS
Croceine Scarlet O extra	K	WGS
Cross Dye Black B, 4B, 6B	H	CD
Cross Dye Black RT	H	Sulphur
Cross Dye Drab	H	Sulphur
Cross Dye Yellow	H	Sulphur
Crow Black	Mz, PK	CD
Crumpsall Direct Fast Brown B, MO	Lev	CD
Crumpsall Fast Yellow YYFD	Lev	CD
Crumpsall Yellow	Lev	WGS
Crystal Ponceau	A, PK	WGS
Crystal Ponceau 6R	Mz, Math	WGS
Crystal Scarlet 6R	Mz, Math	WGS
Crystal Violet 5B, 10B	Math.	
Crystal Violet 5BO	Klp	WN, SS, CT
Crystal Violet O	Mz, PK	WN, SA
Crystal Violet P	By	WN, SA
Cuba Black R	O	CD
Cumidine Ponceau	Mz, A, PK	WGS
Cumidine Red	Mz, A, PK	WGS
Cupramine Brilliant Blue RB	K	CD
Cupranil Brown B, RC	Klp	CD
Curcumeine extra	A	WGS
Curcumine	O	WGS, SS
Curcumine S, S extra	Mz. A, By	CD
Curcumine Substitute	SS	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Curophenine	ClCo	CD
Cutch Brown D	Mz, N	WG, SA, CT
Cutch Brown D	ClCo	CD, WGS
Cutch Brown G	Mz	WG, SA, CT
Cutch Brown GG	BrS	CD
Cutch Brown O, R, VY	ClCo	CD, WGS
Cyananthrene B double	B	Vat
Cyananthrol BGA, R, RA, RB, RBA, RGA, 3G	B	WGS
Cyanine B	Mz	WGS, SS
Cyanol extra, BB, FF, C	Math	WGS
Cyanol Fast Green G	Math	WGS
Cyanol Green B, CG, 6G	Math	WGS
Cyanosine	Klp.	
Cyanosine Alcohol Soluble	Mz.	
Cyklamine	Mo	WG, SA
Cyprus Blue R	A	WGS Copper
Cyprus Green B	A	WGS Copper
Dahlia		WGS, SS, CT
Dahlia for white	Kell	SS
Dark Blue	Mz, PK	WGS
Dark Brown	SW	CD
Dark Brown M, MB	Mz	WG, SA, CT
Dark Brown Salt G, R	Mz	Printing
Dark Green	PK	WGS
Dark Green 682	BrS	CD
Deep Wool Black 2B, 3B	A	WG
Delphine Blue B, B conc.	Mz, S	WCh
Delta Purpurine 5B	Mz, By	CD
Delta Purpurine 7B	Mz, A, By	CD
Delta Purpurine G	By	CD
Diamine Azo Black B, BB pat	Math	CD
Diamine Azo Blue 54, 55	Math	CD

Name of Dye.	Agent or Maker.	Dye Method.
Diamine Azo Blue R, RR, pat	Math	CD
Diamine Azo Scarlet 4BL ex, 8B ex	Math	CDv
Diamine Benzol Blue G, R	Math	CD
Diamine Black B, BH, BO, HW, RO, BX, RMW	Math	CD
Diamine Black Blue B	Math	CD
Diamine Black Green N	Math	CD
Diamine Blue B, 2B, 3B, BG, BX, C4B, 6G, C4R, LG, C2R, LR, NC, RW, 3R, SRX, 50, 52, 53, 55, AB, AZ	Math	CD
Diamine Blue Black E, 72592, R, RL	Math	CD
Diamine Bordeaux B, S	Math	CD
Diamine Brilliant Blue G	Math	CD
Diamine Brilliant Bordeaux R	Math	CD
Diamine Brilliant Rubine S	Math	CD
Diamine Brilliant Scarlet S	Math	CD
Diamine Brilliant Violet 2R	Math	CD
Diamine Bronze B, C, SF	Math	CD
Diamine Brown B, GG, 3G, M, OO, QQ, 5G, R4G, V, 31, 32, 33, 34, 35, 36, 37	Math	CD
Diamine Catechine B, G, pat. 3G	Math	CD
Diamine Catechu	Math	CD
Diamine Cutch	Math	CD
Diamine Cyanine B, 3B, R	Math	CD
Diamine Dark Blue B, R	Math	CD
Diamine Dark Green	Math	CD
Diamine Deep Blue RB	Math	CD
Diamine Deep Dark Blue B, R	Math	CD
Diamine Fast Black L, CB	Math	CD
Diamine Fast Blue C, FFB, FFG, G	Math	CD
Diamine Fast Bordeaux 6BS	Math	CD
Diamine Fast Brown G	Math	CD
Diamine Fast Orange EG	Math	CD

Name of Dye.	Agent or Maker.	Dye Method.
Diamine Fast Red, F	Math	CD
Diamine Fast Scarlet BB, 4B, GB, GG, GS, 4BN, 6BS, 8BN, GFF, 4BFS, 4BFF, 5BFF, 7BFF, 8BF, 10BF	Math	CD
Diamine Fast Violet FFB, FFR, FFRN	Math	CD
Diamine Fast Yellow A, AR, B, FF, M, 3G, A2G	Math	CD
Diamine Gold	Math	CD
Diamine Gold Yellow	Math	CD
Diamine Gray G	Math	CD
Diamine Green B, G, CL	Math	CD
Diamine Heliotrope G, B	Math	CD
Diamine Milling Black B, FG extra	Math	CD
Diamine Jet Black CR, OO, 4D, RB, SE, SOOO, JEI	Math	CD
Diamine New Blue G, P, R	Math	CD
Diamine Nitrazol Black, B, BB	Math	CD
Diamine Nitrazol Bordeaux	Math	CD
Diamine Nitrazol Brown B, BD, T, G, RD	Math	CD
Diamine Nitrazol Green GF, BB, S	Math	CD
Diamine Orange D, DC, G, GC, R, B, F	Math	CD
Diamine Pure Blue, A, FF	Math	CD
Diamine Red B, 3B, 10B, D, NNO, No. 72732	Math	CD
Diamine Rose RD, B extra, BG, GD, GGN	Math	CD
Diamine Scarlet B	Math	CD
Diamine Scarlet 3B	HS, Math	CD
Diamine Sky Blue, FF	Math	CD
Diamine Steel Blue L	Math	CD
Diamine Violet N	Math	CD
Diamine Violet Red	Math	CD

Name of Dye.	Agent or Maker.	Dye Method.
Diamine WO	Math	CD
Diamine Yellow N, paste, R paste, CP	Math	CD
Diamineral Black B, 3B, 6B	Math	CD
Diamineral Blue R	Math	CD
Diamineral Brown G	Math	CD
Diaminogene B, BR, CF, extra	Math	CDv
Diaminogene Blue BB, G, RA, 2RA, NA, NB, 3RN	Math	CDv
Diaminogene Sky Blue	Math	CDv
Diamond Black F, NG, GA, FB, PV, PVB, P2B	By	WGSCh
Diamond Blue 4R	UI	WGS
Diamond Blue Black G, R, T, BR	By	WGSCh
Diamond Bordeaux R	By	WACh
Diamond Brown R, 3R	By	WGSCh
Diamond Flavine G	By	WCh
Diamond Green 3G	By	WACh
Diamond Green SS	Mo, By	WGSCh
Diamond Green B, G	PK.	
Diamond Green crystals	KB.	
Diamond Orange paste	By.	
Diamond Phosphine D, GG PG, R	Math	CT
Diamond Red G, 3G, SB, 5B	By	WACh
Diamond Yellow paste G, R	By	WCh
Dianil Azurine G, G conc., 3G, 3R	Mz	CD
Dianil Black AC	Mz	CDv
Dianil Black CB, CR	Mz	CDv
Dianil Black E, ES	Mz	CDv
Dianil Black G	Mz	CDv
Dianil Black HW	Mz	CD
Dianil Black N	Mz	CD
Dianil Black PG, PR	Mz	CDv
Dianil Black R	Mz	CDv

Name of Dye.	Agent or Maker.	Dye Method
Dianil Black RN	Mz	CD
Dianil Black T	Mz	CDv
Dianil Blue B, BX, 2BM, 3BM	Mz	CD
Dianil Blue E, ET, EG	Mz	CD
Dianil Blue G	Mz	CD
Dianil Blue HG, H2G, H3G, H6G	Mz	CD
Dianil Blue R, 2R, 3R, 4R, 2RS	Mz	CD
Dianil Blue 2RM, 3RM	Mz	CD
Dianil Brilliant Black B, G, 2G, R, 2R	Mz	CD
Dianil Brilliant Blue 3G, 6G, R	Mz	CD
Dianil Brilliant Yellow S	Mz	CD
Dianil Brown B, BD, BH	Mz	CD
Dianil Brown D	Mz	CD
Dianil Brown G, 2G, 3GO, 3GI, 3GA	Mz	CD
Dianil Brown M, MH	Mz	CD
Dianil Brown R, 3R	Mz	CD
Dianil Brown X	Mz	CD
Dianil Chrome Brown G, R	Mz	CD
Dianil Chrome Blue B	Mz	CD
Dianil Claret B, G	Mz	CD
Dianil Crimson B, G	Mz	CD
Dianil Dark Blue R, 3R	Mz	CD
Dianil Dark Green B, X, X conc	Mz	CD
Dianil Deep Black. B conc., FF conc., TV conc., BR extra conc.	Mz	CD
Dianil Direct Yellow S	Mz	CD
Dianil Fast Black G	Mz	CD
Dianil Fast Blue B, 5B, GL	Mz	CD
Dianil Fast Brown B, R, 2G, GR, 3R	Mz	CD
Dianil Fast Green B	Mz	CDv
Dianil Fast Olive Green GG	Mz	CD
Dianil Fast Orange F, O, RR	Mz	CD
Dianil Fast Red F	Mz	CD

Name of Dye.	Agent or Maker.	Dye Method.
Dianil Fast Scarlet 4BS, 6BS, 8BS, GS, RS, 4BL	Mz	CD
Dianil Green G, B, BN, BBN, GN, E	Mz	CD
Dianil Indigo O	Mz	CD
Dianil Japonine G	Mz	CD
Dianil Orange F, G, O, BM	Mz	CD
Dianil Pink BD	Mz	CD
Dianil Red 4B, 6B	Mz	CD
Dianil Scarlet G, 2R	Mz	CD
Dianil Violet H	Mz	CD
Dianil Yellow G, 3G, R, OO, MB	Mz	CD
Dianisidine Blue	By, Mz	Printing
Dianol Black Brown	Lev	CD
Dianol Blue G, BH	Lev	CD
Dianol Brilliant Red extra	Lev	CD
Dianol Brilliant Violet 2B	Lev	CD
Dianol Brown NB, R, Y, YY	Lev	CD
Dianol Fast Claret 3B	Lev	CD
Dianol Fast Red KN	Lev	CD
Dianol Green G	Lev	CD
Dianol Olive	Lev	CD
Dianol Orange Brown, ABZ	Lev	CD
Dianol Violet 2B, R	Lev	CD
Dianthine, B, G	Lev	CD
Dianthine Pink	BrS	CD
Diazanil Black B, D	Mz	CDv
Diazanil Blue BB	Mz	CDv
Diazanil Scarlet B, 6B, G	Mz	CDv
Diazethyl Black B, R	By	CD
Diazine Black BRS	Kell	CD
Diazine Blue B, 2B, R	K	CT
Diazine Brown	K	CT
Diazine Green	K	CT

Name of Dye.	Agent or Maker.	Dye Method.
Diazo Black	K	CT
Diazo Black 2B, BHN, 3B, G, R	By	CD
Diazo Blue B	By	CDv
Diazo Blue Black RS	By	CDv
Diazo Bordeaux, 7B	By	CDv
Diazo Brilliant Black B, R	By	CDv
Diazo Brilliant Orange G	By	CDv
Diazo Brilliant Scarlet Bex, 3Bex, 6Bex, BAex, 3BAex, Gex, 2BL extra, conc, 5BL extra	By	CDv
Diazo Brown G	By	CDv
Diazo Brown R extra, V	By	CDv
Diazo Deep Blue BB, 3B	By	CDv
Diazo Fast Black	Bal	WGS
Diazo Fast Black BHX, 3B, G, MG	By	CD
Diazo Fast Black SD	By	CDv
Diazo Fast Green BL	By	CDv
Diazo Fast Red 7BL	By	CDv
Diazo Indigo Blue B, M, BR, extra, 3R, 2RL, 4RL, 4GL	By	CDv
Diazo Light Red 7BL, 5BL	By	CDv
Diazo Light Violet BL	By	CDv
Diazo Light Yellow G	By	CDv
Diazo Marine Blue B, G	O	CDv
Diazo Navy Blue 3B	By	CDv
Diazo Olive G	By	CDv
Diazo Pure Blue 3B	By	CDv
Diazo Rubine R	By	CDv
Diazo Violet R	By	CDv
Diazogene B, BB, 3B	By	CDv
Diazurine B, G	Kell	CDv
Diazyl Black	Bs	CD
Diazyl Brown G, T	Bs	CD

Name of Dye.	Agent or Maker.	Dye Method.
Dimethyl Orange	Bs	CD
Dingley Blue B, 2R	Sch	CD
Dingley Yellow 17	Sch	CD
Dioxine	L	WCh
Diphene Blue B Base, R Base	A	CD
Diphenylamine Blue	Mz.	
Diphenylamine Orange	Klp.	
Diphenyl Black B, DBB, ERF, 3G, R, RR	Kell	CD
Diphenyl Blue B, 2B, BM, DBB, EFR, EFS, 3G, NT, RR	Kell	CD
Diphenyl Blue Black	Kell	CD
Diphenyl Brown B, BY, CB, CG, CGG, R, RR, Y, 3G	Kell	CD
Diphenyl Chrysoine RR, 3G	Kell	CD
Diphenyl Catechine G, R, B	Kell	CD
Diphenyl Citronine G	Kell	CD
Diphenyl Dark Blue R	Kell	CD
Diphenyl Fast Black	Kell	CD
Diphenyl Fast Brown G, GN	Kell	CD
Diphenyl Fast Black	Kell	CD
Diphenyl Fast Yellow G, GG	Kell	CD
Diphenyl Gray	Kell	CD
Diphenyl Green G, GB, 3G, KCG	Kell	CD
Diphenyl Indigo Blue	Kell	CD
Diphenyl Orange GG, RR, ORW	Kell	CD
Diphenyl Phosphine G, conc.	Kell	CD
Diphenyl Red 8B	Kell	CD
Diphenyl Violet R, BC, BV	Kell	CD
Diphenyl Yellow, R, GG, 3G	Kell	CD
Direct Black B	SS	CD
Direct Black BFG	A	CD
Direct Black GBN, K, G	Klp	CD

Name of Dye.	Agent or Maker.	Dye Method.
Direct Black R	SS	CD
Direct Black X	Bs	CD
Direct Black BK	Klp	CD
Direct Black DR, X	Bs	CD
Direct Black No. 8	A C	CD
Direct Black No. 5062	At	CD, CDv
Direct Blue B	Mz, K, Klp	CD
Direct Blue 2B	SS	CD
Direct Blue 3B	Jy	CD
Direct Blue 3BN	K	CD
Direct Blue 3BX	SS	CD
Direct Blue G, R	Mz	CD
Direct Blue R	Klp	CD
Direct Blue 2R, 3B, 2R	Jy, SS.	
Direct Blue Black 2B	By	CD
Direct Brilliant Blue BM	Mz	CD
Direct Brilliant Orange BO	L	CD
Direct Brilliant Orange M	Mhy	CD
Direct Brown BB	Bs	CD
Direct Brown BL	BL	CD
Direct Brown BS, GS, RS	Kell	CD
Direct Brown GG	By	CD
Direct Brown GX	Bs	CD
Direct Brown J	Klp	CD
Direct Brown M	SS	CD
Direct Brown N	L	CD
Direct Brown NX	Bs	CD
Direct Brown RD, 35	BL	CD
Direct Brown R, S	Kell	CD
Direct Brown RS	Kell	CD
Direct Brown SDP	SS	CD
Direct Brown TB	Mz	CD
Direct Brown TS, TSB	Klp	CD

Name of Dye.	Agent or Maker.	Dye Method.
Direct Brown VX	Bs	CD
Direct Brown 130, 131	HS	CD
Direct Brown 5002	SJW	CD
Direct Buffalo Brown R	Sch	CD
Direct Catechu Brown	NI	CD
Direct Cross Dye Black RH, RS, NM, AM	H	Sulphur
Direct Cross Dye Blue B, R	H	Sulphur
Direct Dark Green	Mz	CD
Direct Deep Black E, R, RW, T, E extra, RW extra	By	CD
Direct Deep Red P	At	CD
Direct Fast Brown B, GG	By	CD
Direct Fast Scarlet B, 3B, GR	I	CD
Direct Fast Yellow B, BN	L	CD
Direct Garnet A	BL	CD
Direct Golden Yellow	BL	CD
Direct Gray	Jy	CD
Direct Gray B	Klp, SS	CD
Direct Gray J	SS	CD
Direct Gray N	AC	CD
Direct Gray R	SS, Klp	CD
Direct Gray reddish	Klp	CD
Direct Gray 4R	SS	CD
Direct Green, CP	Klp	CD
Direct Green B, No. 276	AC, SS	CD
Direct Green BX, S	BL	CD
Direct Green C, CB	Mz, Kell	CD
Direct Green CY	Kell	CD
Direct Green G	Jy	CD
Direct Green P, A	Klp	CD
Direct Green Y	Klp	CD
Direct Green YYC	Sch	CD

Name of Dye.	Agent or Maker.	Dye Method.
Direct Green 177, 228	HS	CD
Direct Indigo Blue A, BN	Klp	CD
Direct Indigo Blue RB	At	CD & CDv
Direct Indigo Blue BK	Klp	CD
Direct Lemon Yellow	Klp	CD
Direct Navy Blue C, SB	Sch	CD
Direct New Blue 4B	A	CD
Direct Olive Y	Sch	CD
Direct Orange	Fi.	
Direct Orange G	HS	CD
Direct Orange KR, KY	Kell	CD
Direct Orange OR, R	Kell	CD
Direct Orange R	SS	CD
Direct Orange 2R	K	CD
Direct Orange Y	SS	CD
Direct Orange 12, 69	HS	CD
Direct Oriol Yellow	Kell	CD
Direct Pink	Sch	CD
Direct Pink B	Jy	CD
Direct Pink G	S	CD
Direct Plum	Jy	CD
Direct Red	A, By, Fi, Kell	CD
Direct Red B	Bs	CD
Direct Red C, B	AC	CD
Direct Red E, T	Kell	CD
Direct Red 5SE	Kell	CD
Direct Red No. 55	HS	CD
Direct Red extra	Jy	CD
Direct Safranine B	By	CD
Direct Salmon	At	CD
Direct Scarlet B, conc.	K	CD
Direct Scarlet G	K	CD
Direct Scarlet R	K	CD

Name of Dye.	Agent or Maker.	Dye Method.
Direct Sulpho Black RH, RS	H	**Sulphur**
Direct Tan 5506	HS	CD
Direct Union Black	Jy.	
Direct Violet A, C	Sch	CD
Direct Violet R	Jy	CD
Direct Violet 6R extra	SS	CD
Direct Yellow	A, Bi, Fi, K, SS	CD
Direct Yellow C	KSS	CD
Direct Yellow C, P	Klp	CD
Direct Yellow BSR, BLR	At	CD
Direct Yellow G	AC, K, SS	CD
Direct Yellow 2G, 3G	K	CD
Direct Yellow NW	BL	CD
Direct Yellow R	AC, By	CD
Direct Yellow R extra	By	CD
Direct Yellow S	Sch	CD
Direct Yellow T	Klp	CD
Direct Yellow 443	FGB	CD
Direct Yellow 9673	Jy	CD
Discharge Black AF	Mz	WGS, SS
Discharge Brown BR	I	CDv
Discharge Navy Blue N Extra Conc.	Mz	Printing
Disulphine Blue G	H	WGS
Domingo Alizarine Black. BG, RB	L	WGSCh
Domingo Alizarine Blue G. R	L	WGSCh
Domingo Alizarine Brown B, G, L.	L	WGSCh
Domingo Black LK	L	WGS
Domingo Blue Black R. B	L	WGS
Domingo Blue P, N, BB	L	WGS
Domingo Chrome Black MFF, O, OO.	L	**Special**
Domingo Chrome Brown	L	WACh
Domingo Chrome Red G	L	**Special**
Domingo Chrome Yellow G	L	**Special**

Name of Dye.	Agent or Maker.	Dye Method.
Domingo Green 3G, H	L	WCh
Domingo Seal Brown	L	WACh
Dominion Yellow O	At	CD
Double Brilliant Scarlet G, 2B, BR	A	WGS
Double Brilliant Scarlet 3R	By	WGS
Double Green S, F	K.	
Double Ponceau 2R, 3R, 4R	By	WGS
Double Scarlet	K	WGS
Double Scarlet extra S	A	WGS
Double Scarlet G	tM	WGS
Double Scarlet R	Lev	WGS
Double Scarlet 2R	tM	WGS
Durophenine Brown V	Cl Co	CD
Eboli Blue	LBs	WG, CD
Eboli Blue B, 6R	L	CD
Eboli Green B, G	L, Klp	CD
Eboli Sky Blue, 3B, 5B	L	CD
Ebony Black	Klp	CD
Ecarlate B	SS	CD
Ecarlate J, JJ, V	RF	WGS
Ecarlate Brilliante	RF	CD
Ecarlate Croceine 3B	Mo.	
Echurine	LM.	
Eclipse Black B, H	Kell	Sulphur
Eclipse Blue B, R	Kell	Sulphur
Eclipse Bronze	Kell	Sulphur
Eclipse Brown 3G, V	Kell	Sulphur
Eclipse Corinth G	Kell	Sulphur
Eclipse Dark Brown	Kell	Sulphur
Eclipse Green GP	Kell	Sulphur
Eclipse Olive	Kell	Sulphur
Eclipse Phosphine GG, R	Kell	Sulphur
Eclipse Yellow G, 3G	Kell	Sulphur

Name of Dye.	Agent or Maker.	Dye Method.
Elgene Base B	A	CD
Elgene Blue	A	CT
Emerald Green Crystals	PK, Bt, By	WG, SA, CT
Emin Red	A	WGS
Empire Black B, G	At	WACh
Empire Orange G	Bch.	
English Yellow		WGS
Eosamine B	A	WGS
Eosine A	PK	WA, SA
Eosine A conc., 2A, AG, A6G	Mz	WA, SA
Eosine bluish	HM, Kell	WA, SA
Eosine B	Klp	WA, SA
Eosine BB	Klp	WA, SA
Eosine 3B	Mz	WA, SA
Eosine 10B, BF	Math	WA, SA
Eosine BN	Math, PK	WA, SA
Eosine DH, DHV	Klp	WA, SA
Eosine extra, extra yellow, extra conc., extra BB, AG, A3G, A5G, D	Mz	WA, SA
Eosine Bluish, extra yellow, yellowish	Kell	WA, SA
Eosine G	Math	WA, SA
Eosine GGB, GGF, GGG	Math	WA, SA
Eosine J	HM, PK	WA, SA
Eosine 3J, 4J, extra	Mz	WA, SA
Eosine JJF	Math	WA, SA
Eosine S	PK	WA, SA
Eosine Y	HM, Sch	WA, SA
Eosine 2110, 5765	Math	WA, SA
Eosine Scarlet B	Mz, Math	WA, SA
Eosine Scarlet BB extra	Mz, Kell	WA, SA
Eosine Yellowish	A, BrS, K	WA, SA
Era Chrome Brown B	Lev	WACh

Name of Dye.	Agent or Maker.	Dye Method.
Erie Blacks	Sch	CD
Erie Green 235, DB, BT	Sch	CD
Erie Blue BX	Sch	CD
Erika B, BN, Bex	A	CD
Erika G, G ex	A	CD
Erika 3GN, 2GN	A	CD
Erio Blue BB, G, R, RR	Kell	WGS
Erio Carmine R	Kell	WGS
Erio Chrome Black A, B, BB, M, T	Kell	WACh
Erio Chrome Blue Black B	Kell	WACh
Erio Chrome Blue R	Kell	WACh
Erio Chrome Bordeaux B	Kell	WACh
Erio Chrome Brown B, G	Kell	WACh
Erio Chrome Indigo	Kell	WACh
Erio Chrome Olive G	Kell	WACh
Erio Chrome Phosphine	Kell	WACh
Erio Chrome Violet B	Kell	WACh
Erio Chrome Yellow 6G	Kell	WACh
Erio Chrome Yellow G, 3G	Kell	WGSCh
Eriocyanine A	Kell	WGS, SS
Erioglaucine X	Kell	WGS, SS
Erio Rubine G, 2R	Kell	WGS
Erio Violet B, RL	Kell	WGS
Erio Viridine B	Kell	WGS
Erythrine	PK	SA
Erythrine X	PK	WGS
Erythrosine	Br S, Klp, PK	WA
Erythrosine	Mz, PK	WA
Erythrosine, Bluish, Yellowish	Kell	WA
Erythrosine A conc. pure	Mz	Foods
Erythrosine AG	Mz	WA
Erythrosine B, BB	A	WA
Erythrosine blue shade	Mz	WA

Name of Dye.	Agent or Maker.	Dye Method.
Erythrosine BNT, D, DS	Math	WA
Erythrosine extra	Mz	WA
Erythrosine G	PK	WA
Erythrosine yellow shade	Mz, Math	WA
Erythrosine 694	Sch	WA
Ethyl Black 3B, T	B	WGS
Ethyl Blue B	B	WGS
Ethyl Blue BF	Mz	CT
Ethyl Blue BD, RD	Mz	Printing
Ethylene Blue, B, G, R, RR	B	SA
Ethyl Eosine	A, Bt	WGS, SS
Ethyl Green	PK	WGS
Ethyl Purple 6B	PK	Special
Euchrysine CG, R	B	Leather
Excelsior Lake Scarlet JN, 2JCN	Math	WGS
Excelsior Black	Math	WGS
Excelsior Black B, G, 5G	Sch	WGS
Fast Acid Black B, 3B	ADC	WGS
FastAcid Black 3B, R, T	Mz	WA
Fast Acid Blue B	By	WGS
Fast Acid Blue R, R conc.	Mz	WGS, SS
Fast Acid Cyanine GR, 5R	By	WGS
Fast Acid Eosine G, G extra	Mz	WGS
Fast Acid Fuchsine B	By	WGS
Fast Acid Green B, BN, BS, BZ	Math	WGS
Fast Acid Green BB, extra	Mz	WGS
Fast Acid Magenta G, G conc.	Mz	WGS
Fast Acid Phloxine A, A extra	Mz	WGS
Fast Acid Ponceau	Klp	WGS
Fast Acid Red A	Mz	WGS
Fast Acid Red B	Mz, PK	WGS
Fast Acid Red ER	L	WGS
Fast Acid Scarlet	Klp	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Fast Acid Violet A2R	Mz	WGS, SS
Fast Acid Violet B, BE	Mz	WGS, SS
Fast Acid Violet 10B	By	WGS
Fast Acid Violet R, RBE, RGE	Mz	WGS, WCh
Fast Azo Garnet Base	Mz	Printing
Fast Azo Grenat		MWGS
Fast Black B, BS	B	Sulphur
Fast Black D	Sch	CD
Fast Blue	Mz, Brs	WGS
Fast Blue B for wool	Mz, A, PK	WGS
Fast Blue for Cotton, B, 3B, 3R	Kell	CT
Fast Blue for Cotton, B, 2B, 3B, 4B, 5B, 6B	Mz	CT
Fast Blue for Cotton, B, B2, BR2	A	CT
Fast Blue for Cotton R, 2R, 3R, RB	Mz	CT
Fast Blue for Cotton, TAI, TAII, TAIII	Mz	CT
Fast Blue 2B for Cotton	A, NI, SS	CT
Fast Blue 5B greenish	Mz	WGS
Fast Blue B, BA, 3B, 6B, for wool	A	WGS
Fast Blue 6B for wool	A	WGS
Fast Blue BN	Math	WGS
Fast Blue BBH	L	CT
Fast Blue Black paste	Mz	CT
Fast Blue Black M paste	Mz	CT
Fast Blue C	Jy.	
Fast Blue D	Mz	WGS
Fast Blue EL	O.	
Fast Blue E, EOOO	O	WGS
Fast Blue extra greenish	Mz	WGS
Fast Blue FS	Mz	WGS
Fast Blue G	Bd, Bt	WGS
Fast Blue G extra	Mz	WGS
Fast Blue greenish	Mz, PK	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Fast Blue 6G	Math	WGS
Fast Blue N	Sch	WGS
Fast Blue NG, NR	O	WGS
Fast Blue O, OO	Mz, Klp	WGS
Fast Blue OOO	O	WGS
Fast Blue BRG for cotton	A	CT
Fast Blue 3R for cotton crystals	Mz	CT
Fast Blue R	Mz, A, Math, PK	WGS
Fast Blue R, RA for wool	A	WGS
Fast Blue 2R, 3R, 5R, No. 60	Mz	WGS
Fast Blue, RD, RRD	Math	WGS
Fast Blue III R	S	CT
Fast Bordeaux O	Mz	WCh
Fast Brown	Mz	WGS
Fast Brown 3B, G	A	WGS
Fast Brown N	PK	WGS
Fast Brown ONT yellowish	Mz	WGS, SS
Fast Brown R	Mz, Pk	CD
Fast Brown 25	A	WGS
Fast Chrome Black L, M	H	WACh
Fast Claret	HS, Klp	WGS
Fast Claret Red O	Mz	WGS, SS
Fast Cotton Blue B, 3B, R, RR, 3R	Mz	CT
Fast Cotton Brown R	Kell	CD
Fast Cotton Orange 6R extra	Bs	CD
Fast Cotton Yellow 10G	Mz	WG, SA, CT
Fast Cyanine Brown R	D	WACh
Fast Cyanine Green G	D	WACh
Fast Cyanine Navy Blue	D	WGS
Fast Dark Blue B	Mz	WGS
Fast Diamine Yellow ARR	Bs	CD
Fast Direct Blue	Mhy	CD
Fast Direct Blue G	Bt	CD

Name of Dye.	Agent or Maker.	Dye Method.
Fast Direct Brown BB, G	Bs	CD
Fast Fulling Blue RR	Bs	CD
Fast Gray B, R	Klp	WCh
Fast Green	O	CT
Fast Green No. 12 paste	Mz	WCh
Fast Green No. 16	Mz	WCh
Fast Green Crystals O	Mz	WCh
Fast Green extra, extra bluish	By	WGS
Fast Green B, CR	By	WGS
Fast Green B	Math	WGS
Fast Green CR	Bs	WACh
Fast Green M, SS	By	WGS
Fast Indigo Blue R	Klp	Printing
Fast Light Green	K	WGS
Fast Light Orange G	By	WGS
Fast Light Yellow, G, 2G, 3G	By	WGS
Fast Milling Red G	Lev	WCh
Fast Mordant Black B, T	Mz	WACh
Fast Mordant Blue B, R, E2G	Mz	WCh, WGSCh
Fast Mordant Yellow G	By	WGS
Fast Navy Blue A, G	PK	CT
Fast Navy Blue GM	O	CT
Fast Navy Blue M	K	WGS
Fast Navy Blue RA	K	CT
Fast Navy Blue RM	O	CT
Fast Navy Blue RN	K	CT
Fast Neutral Violet B	O	CT
Fast New Blue for Cotton	Math	CT
Fast Orange O	Mz	Lakes
Fast Pink B	At	WGS
Fast Pink for Silk	Klp	CD
Fast Ponceau B, 2B	Klp.	
Fast Red	Mz, CDC, A, Klp	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Fast Red A	A, By, K, O, PK	WGS
Fast Red B	NI, PK	WGS
Fast Red BT	By, Klp	WGS
Fast Red C	PK	WGS
Fast Red D	O, PK	WGS
Fast Red E	By, PK	WGS
Fast Red E, B	PK, Bs	WGS, SS
Fast Red extra	Kell	WGS, SS
Fast Red 7B	NI.	
Fast Red NS	By	WGS, SS
Fast Red O	Mz	WGS
Fast Red R	AC	WGS
Fast Red RC	Sch	WGS
Fast Red RR, RY	PK	WGS
Fast Red S	Mz	WGS, SS
Fast Scarlet, B	K	WGS
Fast Silk Gray O	Mz	SS
Fast Silk Yellow GG	L	SA
Fast Sulphon Violet 4R, 5BS	S	WGS
Fast Violet	Klp	WCh
Fast Violet B	Mz	WCh
Fast Violet bluish, reddish	By	WGS
Fast Wool Blue A	A	WGS
Fast Wool Blue RL	By	WGS
Fast Yellow	BrS, By, Math, PK,	WGS
Fast Yellow G	Th	CD
Fast Yellow greenish	Bs	WGS
Fast Yellow M	BL	WGS
Fast Yellow R	K	WGS
Fast Yellow S	Mz, Math	WGS
Fast Yellow 4S	SS	WGS
Fast Yellow TS	Mz	CD

Name of Dye.	Agent or Maker.	Dye Method
Fast Yellow, 1, 2	Sch	CD
Fast Yellow 272	Sch	WGS
Fat Ponceau	Mz.	
Filling Blue	Klp	WCh
Fine Violet	Bt.	
Firn Blue	Klp	WGS, SS, CT
Flavanthrene G, R	B	Printing
Flavazine S, L, T, RL	Mz	WGS
Flavazol	A	WGS
Flavinduline	PK	CT
Flavophosphine, G conc., new, 2G conc., new, 4G conc., new, R conc., new	Mz	CT
Flavophosphine, GO new, 2GO new, 4GO new, RPO new, GCO new	Mz	Leather
Florida Red, B, G, R	L	WGS
Fluoresceine	Mz, Klp, Math, PK	...
Fluoresceine G, R, 6836	Math	WGS, SS
Fluorescent Blue	Klp, SS.	
Formal Fast Black B conc., G conc., R conc.	Kell	CD
Formyl Blue B	Math	WGS
Formyl Violet 4B, 6B, 8B, 10B, S4B, S5B	Math	WGS
Fram Blue G	By	WGS
Fuchsine	Mz, P, By, Klp, Math, O, PK, NI, PS	WG, SS, CT
Fuchsine A	SS	WG, SS
Fuchsine Crystals 685	Sch	WG, CT
Fuchsine FCOOB	Math	WG, SS
Fuchsine S	Mz	WGS, SS, CT
Full Blue O	Klp	WCh
Fulling Black	K	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Fulling Blue	Kell	WGS
Fulling Blue G, R	Mz, Bs	WGS
Fulling Blue JB	Mz	CDv
Fulling Brown JB, JR	Mz	CDv
Fulling Green	At	
Fulling Green JB, JG	Mz	CDv
Fulling Green	Mz, At	WGS
Fulling Red B	Math	WGS
Fulling Red B, FGG, FR, G	Bs.	
Fulling Red JB	Mz	CDv
Fulling Red R	Bs	WCh
Fulling Yellow	Mz	CDv
Fulling Yellow JG, JR	Mz	WGS
Fulling Yellow O	Math	WGS
Fulling Yellow OO	By, Kell	WCh
Fuscamine G	B	Special
Fuscanthrene B paste	PK	Vat
Gallamine Blue	Kell	WCh
Gallanil Green	Klp	WCh
Gallanil Indigo P, PS	Klp	WCh
Gallanil Violet	Klp	WCh
Gallazin A	DH	WCh
Gallazol Blue G	Kell	Printing
Gallein A paste, R paste, W powder	Mz, By, PK	WCh
Gallein paste	Mz	WCh
Gallocyanine BS, DH	Mz, By, PK	WCh
Gallocyanine paste	H.	
Gallocyanine paste D	A, K	WCh
Gallo Fast Black paste	By	Printing
Gallo Grey 2BD, RD	By	Printing
Gallo Heliotrope 2BD	By	Printing
Gallo Violet	By	Printing
Gallo Viridine	By	Printing

Name of Dye.	Agent or Maker.	Dye Method.
Gambine	H	WCh
Gambine B, G, R, Y, YDS, Yellow	H	WCh
Garnet	HS	WGS
Garnet 71031	AC	WCh
Geneva Blue, C, RR	AC	WCh
Geneva Brown	A.	
Gentian Blue 6R	Kell	CT
Gentianin	Kell	WGS, CT
Geranium GN	By	WN, CT
Geranine BB, G	Mz, By	CD
Germania Red	Klp	CT
Giroflé	DH	CT
Glacier Blue	Klp	WGS, SS, CT
Glaucol G	L	WGS
Gloria Black B	Math	WSA
Glycine Blue, Corinth, Red	Ki	CD
Golden Brown	BL	CD
Golden Yellow	H	WGS
Gold Orange	Bs, By	WGS, CT
Gold Orange for Cotton	Klp.	
Gold S, C	Sch	CD
Gold Yellow	By	WGS, SS
Gold 83	Gt	CD
Gray B, R	Klp.	
Green resinate A	Math.	
Grenadine	Mz, NI	WG, SA, CT
Grenadine B, BB, G	O.	
Grenat S	PK.	
Guernsey Blue	Mz, O.	
Guinea Bordeaux B	A	WGS
Guinea Carmine B	A	WGS
Guinea Fast Green B, O	A	WGS
Guinea Fast Violet 10B	A	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Guinea Fast Yellow R, 3G	A	WGS
Guinea Green B, G, B extra, GG	A	WGS
Guinea Red 4R	A	WGS
Guinea Violet 4B	A	WGS
Half Wool Black B, T	O	CWD
Half Wool Black BN, 2BN, 4BN, 2BNI	B	CWD
Half Wool Black LS	By	CWD
Half Wool Black S	Math	CWD
Half Wool Blue B, BD	Mz	CWD
Half Wool Blue G	Math	CWD
Half Wool Black S, 2B, 3B	Math	CWD
Half Wool Black W	Mz	CWD
Hansa Green G	Mz	Lakes
Hansa Red G, B	Mz	Lakes
Hansa Rubine	Mz	Lakes
Hansa Yellow R, G, 5G	Mz	Lakes
Hat Black FC, MC	Math	WGS
Havana RF VB	Math	CT
Havana Black TED	AC	CD
Havana Blue DR, W	AC	CD
Havana Brown CBB, O, No. 50, No. 61, B, YY	AC	CD
Helianthine	Kell, PK	WGS, SS
Heligoland Blue B, G, GA, GG, R, 2R	Jy	CD
Heligoland Brown	NI	CD
Heligoland Red	NI	CD
Heligoland Yellow	NI	CD
Helindone Blue 3GN, 3G	Mz	Vat
Helindone Brown G, AN, 3GN, 5R, 2R, CR	Mz	Vat
Helindone Fast Scarlet R	Mz	Vat
Helindone Gray BB, BR	Mz	Vat
Helindone Green G	Mz	Vat
Helindone Orange R, D, GRN	Mz	Vat

Name of Dye.	Agent or Maker.	Dye Method.
Helindone Pink AN, BN	Mz	Vat
Helindone Red B, 3B	Mz	Vat
Helindone Scarlet S	Mz	Vat
Helindone Violet B, BB, DR	Mz	Vat
Helindone Yellow 3GN, CG	Mz	Vat
Helio Acid Black 4BL, TL	L	WGS
Helio Fast Blue BL	By	Lakes
Helio-Orange GL, RL	By	Lakes
Helio Purpurine 4BL, 7BL, GL	By	Lakes
Heliotrope	Mz, A, By	CD
Heliotrope Tannin	Math	CT
Heliotrope B	Mz, A, By, K	CD
Heliotrope 2B	Mz, A, By, K	CD
Helvetia Blue	Kell	WGS, CT
Hessian Acid Red L	L	CD
Helvetia Green	Bs.	
Hessian Bordeaux	Mz	CD
Hessian Brilliant Purple	Mz, A, By	CD
Hessian Brown, BB, MM	Bs	CD
Hessian Orange	L	CD
Hessian Purple, B, D, N	Mz, A, By	CD
Hessian Violet	Mz, A, By	CD
Hessian Yellow	Mz, A, By	CD
Hoechst New Blue	Mz	WGS
Hofmann's Violet	KB	WG, SS, CT
Hofmann's Violet N	SS	CT
Homophosphine G	L	CT
Hydrazine Yellow O, L, L3G, L3R	O	WGS
Hydroleine Induline, Marine R, Primul.	RE	
Hydrone Blue G, R	Math	Vat
Immedial Black FF extra, G extra, NV extra, NB, NG, 2 extra, BF conc., NBB, NN conc., NNR, NNG, NLN conc.	Math	Sulphur

Name of Dye.	Agent or Maker.	Dye Method.
Immedial Blue	Math	Sulphur
Immedial Blue C	Math	Sulphur
Immedial Bordeaux G conc.	Math	Sulphur
Immedial Brilliant Black B, 5BV conc., 6B conc.	Math	Sulphur
Immedial Bronze S	Math	Sulphur
Immedial Brown B, 2R, BR	Math	Sulphur
Immedial Catechu, BG, BGG	Math	Sulphur
Immedial Dark Brown A, D conc.	Math	Sulphur
Immedial Dark Green B, G	Math	Sulphur
Immedial Direct Blue B, OD, JB, Ind.	Math	Sulphur
Immedial Green BB ex, GG ex	Math	Sulphur
Immedial Green Blue CV	Math	Sulphur
Immedial Indogene GGL conc. BCL, RCL	Math	Sulphur
Immedial Indone R, RB conc., RG conc., BN conc., RR conc., BF conc., 2BF conc.	Math	Sulphur
Immedial Indone Violet B conc.	Math	Sulphur
Immedial Maroon B conc.	Math	Sulphur
Immedial New Blue G conc.	Math	Sulphur
Immedial Olive B	Math	Sulphur
Immedial Orange C	Math	Sulphur
Immedial Prune S	Math	Sulphur
Immedial Sky Blue	Math	Sulphur
Immedial Violet CB	Math	Sulphur
Immedial Yellow D, GG	Math	Sulphur
Immedial Yellow Olive G, 5G	Math	Sulphur
Imperial Black	At	WGS
Imperial Green Crystals	Bt.	
Imperial Scarlet	By	WGS
Imperial Violet Crystals	At	WGS
Indalizarine	DH	WCh
Indamine Blue N, NB, N extra R	Mz	CT

Name of Dye.	Agent or Maker.	Dye Method.
Indamine Gray	NI.	
Indamine 3R, 6R, TD	NI	CT
Indanthrene, C, S, X, CD, SC, GCD	B	Vat
Indanthrene Blue WB, 3G	B	Vat
Indanthrene Claret B	B	Vat
Indanthrene Green B	B	Vat
Indanthrene Orange G	B	Vat
Indanthrene Red G	B	Vat
Indanthrene Scarlet G	B	Vat
Indanthrene Violet RR B ex, RN ex.	B	Vat
Indazine, M, MT, P	Math	CT
Indazurine B, BB, GM, SGM, RM, TS.	B C F.	CD
Indian Yellow	By	WGS, SS
Indian Yellow G, R, FF	Math	WGS
Indigen Blue BB, R	Klp	CD
Indigene D, F	By.	
Indigo Blue N	Math	WG
Indigo Blue BNK	Klp	CD
Indigo Blue SGN	S S.	
Indigo Blue RB	Math	WGS
Indigo Extract, Synthetic MLB	Mz	WGS
Indigo K2B, KG	K	Vat
Indigo MLB	Mz	Vat
Indigo MLB/2B	Mz	Vat
Indigo MLB/4B, MLB/5B, MLB/6B	Mz	Vat
Indigo MLBR	Mz	Vat
Indigo MLBRR	Mz	Vat
Indigo Powders 1006	H.	
Indigo Salt T	K	Printing
Indigo Substitute B, BS, pat	Mz	WGS, SS
Indigo Synthetic	B, M	Vat
Indigo Synthetic MLB, 20% paste, 100% powder	Mz	Vat

Name of Dye.	Agent or Maker.	Dye Method.
Indigotine A, B	Sch	WGS
Indigotine extra L, No. 150	Math	WGS
Indigotine extra L, and No. 1	Klp	WGS
Indigotine O, Synthetic MLB	Mz	WGS
Indigo Vat MLBI, 2, 3	Mz	Dyeing
Indigo Yellow 3G Ciba	I	Vat
Indocyanine B, BF, 2R, 2RF	A	WA
Indoin Blue BB	B	CT
Indo Blue 2B, 2R	By	CT
Indo Violet BF	A	WA
Indophenol White paste	Klp.	
Indophor	PK.	
Induline	Mz, Bs, By, Math, PK	
Induline B	K.	
Induline BE	SS.	
Induline 6B	A.	
Induline B, R powder	Mz	Printing
Induline NN, JS	PK.	
Induline 2N, 2N greenish, SV	Mz	WGS, SS
Induline R	K.	
Induline Red	SS	WGS
Induline Scarlet	PK	CT
Indumen Blue B	AC	WCh
Ingrain Black	H	CDv
Intense Blue	By	WGS
Iodine Eosine	Mo.	
Irisamine G	Math	CT
Iris Blue	PK.	
Iris Violet	PK.	
Isamine Blue B, 6B, R	Math	CT
Iso Diphenyl Black B, BB, R	Kell	CD
Iso Rubin	A	WGS, SS, CT
Italian Green	ClCo	CD

Name of Dye.	Agent or Maker.	Dye Method.
Janus Black O, 1. 2, D	Mz	SA, CDv
Janus Blue B, R	Mz	SA, CDv
Janus Bordeaux B	Mz	CDv
Janus Brown B, R	Mz	SA, CDv
Janus Claret Red B	Mz	CDv
Janus Gray B, BB	Mz	SA, CDv
Janus Green B, G	Mz	SA, CDv
Janus Red B	Mz	SA, CDv
Janus Yellow G, R	Mz	SA, CDv
Jasmine	Kell	WGS, SS
Jet Black R	By	WG, WGS
Jute Black	Mz, Math, O	CT
Jute Black B, 3R	Grie	CT
Jute Black GN	Math	CT
Katigene Black Brown B ext conc., R ext conc.	By	Sulphur
Katigene Black T, SW, 2B, TG, extra, SWR extra, TW extra, ST extra, WR extra, BF extra, 2B ext. conc.	By	Sulphur
Katigene Blue B	By	Sulphur
Katigene Blue Black B, 4B, R, NB ex.	By	Sulphur
Katigene Brilliant Black B, B ex	By	Sulphur
Katigene Brown 2R, 4B, CR ext.	By	Sulphur
Katigene Chrome Blue SG, 5G, 2R	By	Sulphur
Katigene Chrome Brown, 5G	By	Sulphur
Katigene Cutch B	By	Sulphur
Katigene Dark Blue R extra	By	Sulphur
Katigene Deep Black BG, BW, FF, WR.	By	Sulphur
Katigene Green 2 Bex, 4B, 2G	By	Sulphur
Katigene Indigo B, R ext, RL ext, CL. extra, G extra, 4RO extra, CLGG ext. conc.	By	Sulphur
Katigene Khaki G, ext	By	Sulphur

Name of Dye.	Agent or Maker.	Dye Method.
Katigene Olive, G, GN	By	Sulphur
Katigene Red Brown R, CR	By	Sulphur
Katigene Violet B	By	Sulphur
Katigene Yellow Brown R, GR, ext	By	Sulphur
Katigene Yellow G, greenish conc.	By	Sulphur
Kermesine Orange	Mz	WGS
Ketone Blue 4BN, G, R	Mz	WGS, SS
Ketone Green NN	Klp	WGS
Kiamensi Orange G, RR	At	CD
Kiton Blue	Klp	WGS
Kiton Fast Violet 10B	Klp	WGS
Kiton Fast Yellow B, 3G, R	Klp	WGS
Kiton Green	Klp	WGS
Kiton Red S	Klp	WGS
Kiton Yellow S, SR	Klp	WGS
Klondike Black 153	HS	CD
Klondike Black Brown	HS	CD
Klondike Blue 51, 71	HS	CD
Klondike Brown B, G, GG, No. 156	HS	CD
Klondike Olive Brown	HS	CD
Klondike Orange RR	HS	CD
Klondike Red	HS	CD
Klondike Yellow GG, 3G, No. 162	HS	CD
Kresotine Yellow G, R	A, By, O	CD
Kresol Red	PK.	
Kryogene Black B, BA, G	PK	Sulphur
Kryogene Blue R	PK	Sulphur
Kryogene Brown B, G	PK	Sulphur
Kryogene Direct Blue G	PK	Sulphur
Kryogene Olive	PK	Sulphur
Kryogene Yellow R, G	PK	Sulphur
Lake Red C	Mz	Lakes
Lake Scarlet FR, FRR, FRRR, GG, 2R, 3R	Math	WGS

Name of Dye.	Agent or Maker.	Dye Method
Lake Scarlet, GRII, GRCL, RL, 2RL, 2RCL, 3RCL, 3291	Mz	WGS
Lanacyl Blue BN	Math	WGS
Lanacyl Violet BF	Math	WGS
Lanafuchsine SB, SG, 6B	Math	WGS
Lanaglaucine W	Mz	WCh
Laundry Blue B, 1, 2, 3	Math	WGS, SS, CT
Lazuline Blue	By	WGS
Leather Black New	Math.	
Leather Black C	Mz	Chrome
Leather Black T	Mz	Tannin
Leather Black TB, TG	Math	Tannin
Leather Brown	Mz, O	Tannin
Leather Yellow	Mz, Bs, Klp	Tannin
Leather Yellow G, GG	Mz	Tannin
Light Blue	SS, tM.	
Light Green	KB.	
Light Green SF, bluish, yellowish	PK	WGS, SS
Lithol Red, GG	PK	Lakes
London Blue, extra	BrS	WGS, CAl
Luzon Black	At	WGS
Lyons Black	FGB	WGS
Lyons Blue O, R, RR	Mz.	
Madison Blue V	At	CD, CDv
Madras Blue B	At, FTM.	
Madras Blue G	SS	WGS
Madras Blue RR	At	WGS
Magdala Red	Mz, Klp	SA
Magenta	H, Math, Sch,	WG, SA, CT
Magenta Extra Large Crystals, extra yellow, Large Crystals, Small Crystals, Double Refined	Mz	WG, SA, CT
Magenta Large Crystals B	Math	WG, SA, CT

Name of Dye.	Agent or Maker.	Dye Method.
Magenta I	Klp	WG, SA, CT
Magenta Crystals 80408	RH	CT
Malachite Green	A, K, Klp, Math	WN, SA, CT
Malachite Green B	Mz, P, K	WN, SA, CT
Malachite Green BB, 4B	Mz	WN, SA, CT
Malachite Green Crystals	Mz	WN, SA, CT
Malachite Green G	PK	WN, SA, CT
Malachite Green 1a	Mz	WN, SA, CT
Malachite Green Superior	Mz	WN, SA, CT
Malachite Green No. 12	Mz	WN, SA, CT
Malachite Green Powder	Mz	WN, SA, CT
Malta Blue	SS	CT
Malta Gray, J	SS	CT
Malta Yellow AL	SS	CT
Manchester Brown, EE, PS	Math	CT
Manchester Yellow	Lev, RD	WGS
Manhattan Black BS	AC.	
Manila Brown, M15G	Sch	CD
Mandarine G extra, GR	A	WGS
Mandarine Orange G, extra	Mz	WGS
Marine Blue BI, 2RX, RI	Mz	WN, SA, CT
Marine Blue HH	L	WGS
Marinol Acid Blue R	H	WGS
Marion Red	Mz	Lakes
Maroon S	Mz, PK	WGS, SS
Mars Red G	PK	
Martial Black B	SS.	
Martius Yellow	Mz.	
Mauve	SS	SS
Mazarine Blue B, BG, RNS	AC	WCh
Mazarine Brown WO	AC	WCh
Mekon Yellow G, R	Klp	CD

Name of Dye.	Agent or Maker.	Dye Method.
Melanogen G, T	Mz	Sulphur
Melanogen Black G, T	Mz	Sulphur
Melanogen Blue B, BG	Mz	Sulphur
Melantherin JH	Klp	CD
Melanthrene B paste	B	Vat
Meldolas Blue	Math	CT
Melita Blue 6G	L	WGS
Melogen BH	S	CDv
Mercaptol Black	SS	Sulphur
Mercerine Scarlet 5B	H	WGS
Mercerine Wool Red 10B, G, Y	H	WA
Mercerol Blue B	H	WA
Mercerol Brown 3R	H	WA
Mercerol Green 3B	H	WA
Mercerol Wool Yellow R, G	H	WA
Meridian Green B	At	CD
Meridian Violet 51	At	CD
Meridian Yellow OOO	At	CD
Merino Blue, R	SS.	
Merino Brown	SS.	
Merino Yellow	SS.	
Metachrome Bordeaux	A	Special
Metachrome Brown B	A	Special
Metachrome Mordant	A	Special
Metachrome Olive B	A	Special
Metachrome Orange R double, 3R	A	Special
Metachrome Yellow RD, 2RD, D, RA	A	Special
Metamine Blue B, G	Klp	CT
Metanil Red 3B, 3B extra	By	WGS
Metanil Yellow	Mz, A, Bs, By, K, Kell O, Math, PK	WGS
Metaphenylene Blue B, BB	Math	WGS
Metaphenyl Yellow ME	SS	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Methyl Alkali Blue	Mz, K, Kell, Klp, O, PK.	
Methyl Blue	Math, tM	SS, CT
Methyl Blue for Cotton	Mz, O	WGS, SS, CA
Methyl Blue for Silk	Mz, O	SS
Methyl Blue New	Kell.	
Methyl Blue GS	Math.	
Methyl Cotton Blue	Kell	CA
Methyl Diphenylamine Blue	Mz.	
Methylene Blue B	Mz, Kell, O, PK	WN, SA, CT
Methylene Blue B conc.	Mz	WN, SS, CT
Methylene Blue BB	Mz, Sch, A.	WN, SS, CT
Methylene Blue BB conc.	Mz, PK	WN, SS, CT
Methylene Blue BB crystals	CR	WN, SS, CT
Methylene Blue BB, extra	Mz	WN, SS, CT
Methylene Blue powder extra	A, PK	WN, SS, CT
Methylene Blue B, G, B, H	PK	WN, SS, CT
Methylene Blue crystal, chem. pure	Mz	WN, SS, CT
Methylene Blue D, DB, DBB extra, DBB conc., DBB extra conc.	Mz	WN, SS, CT
Methylene Blue D, pure	O	WN, SS, CT
Methylene Blue G	Math	WN, SS, CT
Methylene Blue 4BEE	SS	CT
Methylene Blue 4BEESL	SS	Printing
Methylene Blue RR	O	WN, SS, CT
Methylene Blue 3R, 5R, 6R, D3R, D5R	Mz	WN, SS, CT
Methylene Blue V	Kell	WN, SS, CT
Methylene Blue, Zinc free, pure	Mz	WN, SS, CT
Methylene Dark Blue 3BN, RBN, pat.	Mz	WN, SS, CT
Methylene Gray B, BF, G, ND, NF, O, R	Mz	WN, SS, CT
Methylene Green	Kell	WN, SS, CT
Methylene Green B	Mz, By	CT

Name of Dye.	Agent or Maker.	Dye Method.
Methylene Green G, GG, O, extra yellow, yellow conc.	Mz	WN, SS, CT
Methylene Heliotrope O, OL	Mz	WN, SS, CT
Methylene Indigo O	Mz	WN, SS, CT
Methylene Violet	SS	WN, SS, CT
Methylene Violet BN, RRA, 3RA ext.	Mz	WN, SS, CT
Methylene Yellow H	Mz	CT
Methyl Eosine	A, Klp	WN, SS, CT
Methyl Green	A, By, K, Math, SS.	
Methyl Indigo B, R	Mo	Vat
Methylindone B, R	Math	CT
Methyl Violet B, 2B	Mz, A, By, Math, NI, O, PK.	
Methyl Violet 2B, c. p., 2BN	Mz	WG SA, CT
Methyl Violet 2BC	Sch	WG, SA, CT
Methyl Violet BO	Math	WG, SA, CT
Methyl Violet 3B	Mz, Math, O.	
Methyl Violet 3BD	Math	WG, SA, CT
Methyl Violet 3BO	Bch.	
Methyl Violet 4B	Mz, Math, O	WG, SA, CT
Methyl Violet 4BO	Math	WG, SA, CT
Methyl Violet 5B	Mz, Math, O	WG, SA, CT
Methyl Violet 6B	Mz, Math, O	WG, SA, CT
Methyl Violet 6BO	Mz, K, Math, NI, O, SS	WG, SA, CT
Methyl Violet 6B, chem. pure	Mz	WG, SA, CT
Methyl Violet 6B, crystals	Kell, Klp, PK,	WG, SA, CT
Methyl Violet BSC	Math	WG, SA, CT
Methyl Violet extra	Mz	WG, SA, CT

Name of Dye.	Agent or Maker.	Dye Method.
Methyl Violet OB, OBB, O3B, O4B, O5B, O6B, O3R	O	WG, SA, CT
Methyl Violet R, 2R	Mz, Math	SW, WG, SA, CT
Methyl Violet 3R, 4R	Mz, Math	WG, SA, CT
Methyl Violet 5R	Mz	WG, SA, CT
Methyl Violet RO	Math	WG, SA, CT
Methyl Violet RSJ	Math	WG, SA, CT
Methyl Violet Superior	Mz	WG, SA, CT
Methyl Violet 720	Math	WG, SA, CT
Methyl Water Blue	PK	WG, SA, CT
Metol Blue	LBF	CD
Mikado Brown B, 3GA, MG	Mz, Bs	CD
Mikado Gold Yellow, 2G, 4G, 6G, 8G	Mz, Bs	CD
Mikado Orange G, R, 2R, 3R, 4R, 5R	Mz, Bs	CD
Mikado Yellow, 2G, 4G, 6G	Mz, Bs	CD
Milling Blue 2Rex	Mz	WGS, WGSCh
Milling Blue 85	HS	WGS
Milling Green B	NYB	WGS
Milling Orange	D	WCh
Milling Red E	SS	WGS
Milling Red FFG, FR, G, R	Math	WGS
Milling Red 82	HS	WGS
Milling Scarlet B		WGS
Milling Scarlet 4R conc., 4RO	Mz	WA, WACh
Milling Yellow II, O, OO	Math	WGS
Milling Yellow 55	SS	WGS
Milling Yellow 84	HS	WGS
Milling Yellow R	L	WGSCh
Mimosa, YC	Kell	CD
Moline	At	WCh
Monochrome Blue B, 5R	Mz	Special
Monochrome Brown B	Mz	Special

Name of Dye.	Agent or Maker.	Dye Method
Monochrome Gray G, B, WBG	Mz	Special
Monochrome Green AG	Mz	Special
Monochrome Orange	Mz	Special
Monochrome Red G, 5B	Mz	Special
Monochrome Violet	Mz	Special
Monochrome Yellow G, R	Mz	Special
Montana Brown 3G, M	L	CD
Mordant Yellow G, 3R	PK	WCh
Mordant Yellow O, R	Mz	WCh
Muscarine	Klp	CT
Naccarat	SS	WGS
Nako Black O, OP, DB	Mz	Fur
Nako Brown D, P, PS, DD	Mz	Fur
Nako Red O	Mz	Fur
Nako Yellow O	Mz	Fur
Naphthalene Acid Black S	By	WGS
Naphthalene Black 2B, D	H	WGS
Naphthalene Blue B, 5G, DL	Mz	WGS
Naphthalene Green conc., V	Mz	WGS
Naphthaline Pink or Scarlet, see Magdala Red		
Naphthaline Yellow	Mz, Bs, Math	WGS
Naphthamine Blue 2B, 5B, BR, 2R, 3R	K	CD
Naphthamine Blue BE, GE, 3RE, 12B	K	CDv
Naphthamine Brown 2B, 6B, R, N, 8B, RB	K	CD
Naphthamine Dark Blue R	K	CD
Naphthamine Direct Black FF	K	CD
Naphthamine Fast Black BE, GE, SE	K	CDv
Naphthamine Fast Scarlet B, BG, R, 4B	K	CD
Naphthamine Indigo Blue G, 2B, 5B, 2R, RE	K	CD

Name of Dye.	Agent or Maker.	Dye Method.
Naphthamine Pure Blue G	K	CD
Naphthamine Orange 2R	K	CD
Naphthamine Red H	K	CD
Naphthamine Violet BE	K	CD
Naphthamine Yellow G, 3G, CH	K	CD
Naphthazarine Black	B	WCh
Naphthazarine Blue	Bs	WGS
Naphthazarine Blue B	O	WGS
Naphthazarine Blue O	Bs	WGS
Naphthazarine R, S, B, BE, RE	O.	
Naphthine Brown	SS	WCh
Naphthion Red, see Orseille Substitute V		
Naphthine S	SS.	
Naphthoacetine Fast Black	Sch.	WCh
Naphtho Acid Black, 4BF, 6BF		WGS
Naphthocyanine	EP.	
Naphthol S	Math.	
Naphtho Rubine	By	WGS
Naphthol Black B, BDF	Math	Printing
Naphthol Black BB, 3B, 4B, 6B, 12B	Math	WGS
Naphthol Black 4BA	H	WGS
Naphthol Black D	Mz	WGS
Naphthol Black P, NY, SG, 4R	Math	WGS
Naphthol Blue B, D	RE	WGS
Naphthol Blue 2B	PK	WGS
Naphthol Blue G, R	Math	WGS
Naphthol Blue Black A	Math	WGS
Naphthol Brown 193	HS	WGS
Naphthol Green B, OO	Math	WGS
Naphthol Orange	A	WGS
Naphthol Red	SB	WGS
Naphthol Red C	Math	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Naphthol Red O	Mz	WGS
Naphthol Red S, GR	PK	WGS
Naphthol Yellow	Klp	WGS
Naphthol Yellow S	Mz, By, Klp, Math, O PK	WGS
Naphthol Yellow SE	Mz	WGS, SS
Naphtalene Yellow	Math.	
Naphthylamine Black 4BK, 4BN, 6BN, 10B, ESN, 4BL, 5GL	By	WA
Naphthylamine Black 6BD	Math	WGS
Naphthylamine Blue Black B, 5B	C	WGS
Naphthylamine Brown	PK	WGS
Naphthylamine Pink	Klp	WGS
Naphthylamine Yellow	K	WGS
Naphthyl Blue	K	WGS
Naphthyl Blue 2B	PK	CD
Naphthyl Blue Black MNY, N, R, SB, S2B, S3B, FBB, FB	Math	WGS
Naphthyl Violet	K.	
Naphthylene Blue R, crystals	By.	
Naphtogene Blue B, 2B, 6B	A	CD
Naphtogene Blue 2R, 4R, 6R	A	CD
Naphtogene Indigo Blue B, R	A	CD
Naphtogene Pure Blue 3B, 4B	A	CD
Naphthylene Red	By	CD
Narceine	Klp.	
Navy Blue B	AC, Klp	WGS
Navy Blue BW, H	Klp	WGS
Navy Blue Double conc., DR	O	CT
Navy Blue B, R	Mz	Printing
Navy Blue V	Mz	WGS, SS, CT
Neptune Blue BG, R	PK	WGS
Neptune Green S, SG	PK	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Neptune Marine Blue BBT	B	WGS
Nerol Black B, BB, 2G new, 4B, 2BG, 4BG, BL, 2BL, TL, VL	A	WA
Nerol Blue Black	A	WA
Nerocyanine BS, BT, 2BN, RN	A	WA
Nerogene D	A	Developer
Neutral Blue	Math	CT
Neutral Blue R, 3R	Mz	WN, WGS
Neutral Fast Violet B	Math.	
Neutral Gray G	A.	
Neutral Red extra	Math.	
Neutral Scarlet	Mz	CT
Neutral Violet extra	Math.	
Neutral Violet O	Mz	SA, WN
Neutral Wool Black B, G	Math	WN, WGS
New Acid Green GX, 3BX	By	WGS
New Acridine Orange G	Bs	CT
New Blue B, BF, D, 110, extra F, G, FL, L, O1114A, R, crystal, R powder, 72325	Math	CT
New Blue O	Mz	SS, WGS
New Blue R	Bs, By, Math.	
New Coccine	A, Klp.	
New Coccine O	Mz	WGS, SS
New Coccine R	A	WGS
New Cotton Solid Blue	Klp	CT
New Croceine	PK	CD
New Direct Blue B	A	CD
New Ethyl Blue, B, R, BS, RS	Mz	CT
New Fast Belgium Blue F	AC	WCh
New Fast Black	BL	
New Fast Blue paste, F, H	By.	
New Fast Blue 3R crystals	Mz	CT

Name of Dye.	Agent or Maker.	Dye Method.
New Fast Gray	By	CT
New Fast Green 3B	Klp	CT
New Fast Yellow R	B	WGS
New Fuchsine	Klp	WGS, SS, CT
New Gray	By	WGS, CT
New Green	By	WGS, SS, CT
New Green O paste, powder	Mz	Printing
New Indigo	Klp	CD
New Magenta	O	WN, WG, SA, CT
New Magenta O	Mz	WN, WG, SA, CT
New Metamine Blue M	Mz	CT
New Methylene Blue BB, F, GG, N, NX, NF, R, 3R, 70721	Math	CT
New Methylene Blue N, NH	Mz	CT
New Methylene Blue F, FR	By	CT
New Methylene Gray B paste G powder	Mz	CT
New Patent Black B, E	K	WG, SA
New Patent Blue B, 4B, GA	By	WGS
New Patent Silk Blue	By	SS
New Phosphine G	Math	CT
New Red L	K	WGS
New Solid Green BB, 3B	Klp	WGS, SS, CT
New Toluylene Blue B, GG, M, R	O	CD
New Toluylene Brown B, BB, BBO, P	O	CD
New Turmerine T	BrS	CD
New Victoria Black B	By.	
New Victoria Black Blue	By.	
New Victoria Blue B	By	WGS, CT
New Victoria Blue GG	Klp	CT
New Victoria Green	By.	
New Yellow	PK	WGS, CT
New Yellow L	K.	
Niagara Blue 6B	Sch	CD

Name of Dye.	Agent or Maker.	Dye Method.
Niagara Direct Black	Sch	CD
Niagara Union Black	Sch	CWD
Nicholson Blue	Br, S, Klp.	
Nicholson Blue B, 2B, 4B, R, 2R, 3R	Mz.	
Night Blue	Klp, PK	WGS
Nigramine	Nil	
Nigrogene Orange	PL	WGS
Nigrophor	B	Printing
Nigrosine, J	SS.	
Nigrosine alcohol soluble	Mz, A, Bs, Kell, Math, NI, SS.	
Nigrosine crystals, E, 73651	Math.	
Nigrosine water soluble	Mz, A, Bs, Klp, K, Kell, Math.	
Nigrosine water soluble No. 10, No. 12	Mz.	
Nigrosine Gray Blue, 1, 2, 3, 4	Mz	WN, SS
Nile Blue A, B, 2B, NN, R	PK	CT
Nitrazine Yellow	O.	
Nitrazol C	Math.	
Nitrophenine	ClCo	CD, WCh, SA
Nitrosamine Red	PK	CDv
Nitroso Base M 50%	Mz	Printing
Nitroso Blue MRS	Mz	Printing
Non Mordant Cotton Blue	Br. S.	
Nopaline	tM.	
Nyanza Black B	A, Mz	CD
Nubian Black	HS.	
Oenanthinine	Klp	WGS, SS
Oil Yellow A, B, D	Math.	
Oil Black, Blue, Brown, Green, Orange, Red, Violet	Mz.	
Old Scarlet	By	WGS
Omega Chrome Brown P	S	WGSCh

Name of Dye.	Agent or Maker.	Dye Method.
Omega Chrome Corinth B	S	WGSCh
Opal Blue	Mz, Br, S, Math.	
Opal Blue superfine, soluble	Mz	WGS, SS, CT
Opaline Black 1602	Bch	CD
Opaline 2G, 5G, R	Gb.	
Oramine Blue R	PK	CD
Orange	tM	WGS
Orange Crystals	NYB	WGS
Orange A	Mz, Klp, Math,	WGS, SS
Orange I	Mz, By, K, Klp, Math,	CDC, WGS, SS
Orange II	Mz, Klp, Math, SS,	WGS, SS
Orange III	Klp, Math, SS, WGS, SS	
Orange IV	Mz, Bs, Kell, Klp, PK, SS	WGS, SS
Orange ENL, ENZ, extra, 2G	Math	WGS
Orange G	Mz, A, Math, PK,	WGS
Orange GG	Bs, Math	
Orange GG crystal	Math.	
Orange GRX	PK	WGS
Orange GS	O	WGS
Orange GT, RO	By	WGS
Orange M	Klp	WGS
Orange MG paste	Klp	WGS
Orange MN	Klp	WGS
Orange N	K, Klp, PK	WGS
Orange P	O	WGS
Orange R	Mz, Klp, Math, PK,	WGS
Orange RL, RRL, RN		
Orange RR	Math	WGS

Name of Dye	Agent or Maker.	Dye Method.
Orange TA	Mz	WGS, SS
Orange Y	HM, CDC	WGS
Orange 4	Mz, Math	WGS
Orange 4LL	Mz	WGS, SS
Orcelline		
Orchil Crimson powder	PK	WGS
Orchil Substitute G pat.	Mz	WGS
Oriol Yellow	Kell	CD
Oregon Black	AC	CD
Oregon Blue L, U	AC	WGS
Oregon Pink, Red, Yellow	AC	WGS
Orseille Red A	PK	WGS
Orseille Substitute G	A	WGS
Orseille Substitute N extra	Math	WGS
Orseille Substitute V	A, SS	WGS
Orseille Substitute 3VN	SS	WGS
Orseilline BB	By	WGS
Orseilline B, R	Mz	WGS, SS
Ortho Black 3B	A	WGS
Ortho Cerise B	A	WGS
Ortho Cyanine B, 6G, R	A	WGS
Osfachrome Blue Black B	OF	WACh
Osfachrome Gray EG	OF	WAGh
Osfanil Blue B, 3B, CG	OF	CD
Osfanil Orange BR	OF	CD
Osfanil Pure Blue FFK	OF	CD
Osfanil Violet CG, RB	OF	CD
Osfanol Black B	OF	WGS
Osfasulphon Blue, SB, SG, SR	OF	WA
Osfathion Black G4B liquid, T liquid	OF	Sulphur
Oxamine Black, BR, MB, MD, MT	PK	CD
Oxamine Black BH	PK	CDv
Oxamine Blue B, BG, G, BB, BT, BN, 3BN	F, PK	CD

Name of Dye.	Agent or Maker.	Dye Method.
Oxamine Blue 4B, R	PK	CD
Oxamine Blue 3R, RX, 4R, RXNS	PK	CD
Oxamine Blue Black BR	PK	CD
Oxamine Brown G, GR, GN	PK	CD
Oxamine Copper Blue RR	PK	CD
Oxamine Dark Blue BR	PK	CD
Oxamine Dark Brown G, R	PK	CD
Oxamine Fast Bordeaux	PK	CD
Oxamine Fast Red F	PK	CD
Oxamine Green B	PK	CD
Oxamine Maroon	PK	CD
Oxamine Pure Blue A	PK	CD
Oxamine Red, B, MT	PK	CD
Oxamine Scarlet B	F.	
Oxamine Violet, BBR, GR, GRF, MT, RR	PK	CD
Oxblood 8851	Bs	CD
Oxy Chlorazol Blue	H	CD
Oxychrome Black F	O	WGSCh
Oxychrome Brown V	O	WGSCh
Oxychrome Garnet B, R	O	WGSCh
Oxychromine	By	WGSCh
Oxy Diamine Black A, AM, AT, B, BG, BM, BZ, BZS, CBS, D, N, NF, NR, S0000, NRT, R, RR, SA, S000, W, FFC extra, FFG, AFF, JE, JEI, JB, JW	Math	CD
Oxy Diamine Blue 3R, G, 3G, 5G	Math	CD
Oxy Diamine Brown RM, RO	Math	CD
Oxy Diamine Orange G, R	Math	CD
Oxy Diamine Violet B, G, R	Math	CD
Oxy Diamine Yellow GG	Math	CD
Oxy Diaminogen ED, EF, EN, EM, FF, FFG	Math	CDv

Name of Dye.	Agent or Maker.	Dye Method.
Oxydianil Yellow O	Mz	CD
Oxyphenine Gold	ClCo.	
Oxyphenine Gold G	HS	CD
Paeonine	Kell.	
Palatine Black 4B MM	PK	WGS
Palatine Chrome Black S	PK	WGSCh
Palatine Chrome Blue W2B, 2B	PK	WACh
Palatine Chrome Bordeaux	PK	WGSCh
Palatine Chrome Brown	PK	WGSCh
Palatine Chrome Claret	PK	WGSCh
Palatine Chrome Green G	PK	WGSCh
Palatine Chrome Red R, B	PK	WGSCh
Palatine Chrome Violet	PK	WGSCh
Palatine Red	PK	WGS
Palatine Scarlet	PK	WGS
Paper Blues	Mz	
Paper Orange OO	Mz	Paper
Paper Scarlet bluish	PK.	
Paper Scarlet Blue and Yellow, 3B, 8086	Mz	Paper
Paper Yellow GGex, Rex	By	Paper
Paradiamine Black B, BB	Math	CD
Para Black R, 2G, VB ex conc	By	CDv
Para Bronze NB, NG	By	CDv
Para Brown R, RV, V extra	By	CDv
Para Chrysome	By	CDv
Para Green G, 2BL, S	By	CDv
Para Light Green B	By	CDv
Para Olive G	By	CDv
Para Yellow R	By	CDv
Paramine extra	B	Special
Paramine Brown C, R	CR.	
Paramine Indigo Blue, Navy Blue	CR.	

Name of Dye.	Agent or Maker.	Dye Method.
Paranil Brown B, 2B, G, R	A	CD
Paranil Bordeaux B	A	CD
Paranil Scarlet G extra	A	CD
Paranil Yellow G	A	CD
Paraphenylene Blue R, Violet	Bs	CT
Paraphor Brown RK, SK, TK	Mz	Printing
Paraphor Green B	Mz	Printing
Paraphosphine G, R	Math	CT
Paratol Citron	Mz	Lakes
Paratol Chrome Yellow L	Mz	Lakes
Paratol Garnet 2R	Mz	Lakes
Paratol Maroon	Mz	Lakes
Paratol Orange	Mz	Lakes
Paratol Rose	Mz	Lakes
Paratol Red	Mz	Lakes
Paris Violet	SS	CT
Paris Violet 6B, 7B	RE	CT
Parma R paste	S	WCh, CT
Patent Blue A, AJI, B, G conc., Jl, J2, N, L, J3, J0, J00, V, superfine, VG, WE, WS, RL, 2RL, A new, V new	Mz	SS, WGS
Patent Dianil Black FF conc. FFA conc., FFC conc., FFT conc., BS, BSV, EB ext. conc., EBV ext. conc.	Mz	CD
Patent Green O, V	Mz	WGS
Patent Marine Blue LE	Mz	WGS
Patent Orange	A	WGS
Patent Phosphine	Klp	CD
Patent Rock Scarlet..	Br. S	CD
Pecora Black	Sch	CD
Pegu Brown G, DR	Bs	CD
Peri Wool Blue B, G	Math	WGS
Persian Yellow	Kell	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Phenamine Blue B, G, R	PK	WGS
Phenedine Brown, Y, 2Y, 3 Y	SS	CD
Phenedine Brown By, 2By, 3By	SS	CD
Phenedine Orange J	SS	CD
Phenedine Pink JE	SS	CD
Phenedine Yellow 2A	SS	CD
Pheno Black SG	HM	CD
Phenocyanine, B, D	Klp	Printing
Phenocyanine TB, TV, VS	Klp	WCh
Phenol Black SS	By.	
Phenol Blue Black 3B	By	WGS
Phenol Flavine	O.	
Phenylamine Black 4B, T	By	WA
Phenyl Blue Black N	By	WGS
Phenylene Black	SS	WGS
Phenylene Brown BR	O	CT
Phenylene Red B	SS	SA
Phenylene Violet B, R	SS	WGS
Philadelphia Yellow G	A	CT
Philochromine B, G paste	Mz	Printing
Phloxine	Mz, Kell, Klp, Math,	WA
Phloxine B, BB	Mz	WA
Phloxine 5B, BA extra, GO, GA ex	Mz	WA
Phloxine P	PK	WA
Phloxine TA	Mo.	
Phloxine 749	Math.	
Phoenix Red A	Math.	
Phosphine	Mz, Br, S, Kell, Math, NI, PK, SS	Tannin
Phosphine 1A, 11A, extra	Math	Tannin
Phosphine Base L3G, LO, LOB	Mz	Printing
Phosphine N	K	Tannin

Name of Dye.	Agent or Maker.	Dye Method.
Phosphine P, LM, extra	Mz	Tannin
Pigment Brown	PK.	
Pigment Chlorine GG	Mz	Lakes
Pigment Chrome Yellow L	Mz	Lakes
Pigment Fast Yellow G, R	Mz	Lakes
Pigment Orange R	Mz	Lakes
Pigment Purpurine A	Mz	Lakes
Pigment Red B, R	Mz	Lakes
Pigment Scarlet 3B, G, R	Mz	Lakes
Pink BR	BL	CD
Pluto Black B, G, R, A, 3B, CR, L conc., TG extra conc., A extra, CF extra, F extra, 5BS extra BS extra, SS extra	By	CD
Pluto Brown R, V extra	By	CD
Pluto Milling Black B	By	CD
Pluto Orange G	By	CD
Polychromine B, A	Kell	CDv
Polyphenyl Black, B, G	Kell	WG, WGS
Polyphenyl Black GI, RI, T conc., TG conc., TM conc.	Kell	CD
Polyphenyl Orange R extra	Kell	CD
Ponceau B extra	Mz	WGS
Ponceau BO extra BO, BOG	A	WGS
Ponceau Brilliant 4R	Math	WGS
Ponceau G	Mz, Math	WGS
Ponceau 2G	Mz, PK	WGS, SS
Ponceau 4GB	A	WGS, SS
Ponceau GR, GR2, GRCL	Mz	WGS, SS
Ponceau HP	By	WGS
Ponceau J, JJ	Math	WGS, SS
Ponceau R	Mz, A, PK, SS,	WGS, SS

Name of Dye.	Agent or Maker.	Dye Method.
Ponceau 2R, 3R, 2RCL, 3RCL	Mz	WGS, SS
Ponceau 2RS	SS	WGS, SS
Ponceau 3RB	A, PK	WGS, SS
Ponceau 4R	Mz, A, PK	WGS, SS
Ponceau 4RB	A	WGS, SS
Ponceau 5R	Mz	WGS, SS
Ponceau 6R, 6R crystal	Mz, PK	WGS, SS
Ponceau 6RB, 10RB, S extra, SS extra	A	WGS, SS
Ponceau YB	Mz	WGS, SS
Prague Alizarine Yellow G, R	Ki	WCh
Primrose	S.	
Primrose, alcohol and water soluble	Klp.	
Primula B, R	Mz	WG, SA, CT
Primuline	Mz, BrS, By, HS, K, Kell, Math, PK.	
Printing Black for Wool	PK	Printing
Printing Blue	A.	
Printing Blue B, H paste powder	R, Math.	
Printing Brown GR	B	Wool
Prune, powder	Mz	WCh
Prune pure	Mz, Math	WCh
Pure Blue	Mz, Klp, Math, PK.	
Pure Blue BSJ	Klp	WGS, SS
Pure Blue O conc. double conc.	Mz	WGS, SS, CT
Pure Blue extra crystals	O	CT
Pure Blue VC	SS	SA
Pure Fast Yellow	Math.	
Pure Soluble Blue	Math.	
Purple Blue O	Mz	WGS, SS, CT
Purpuramine DH	DH	CD
Purpurine paste	BaCo, By, PK.	
Pyramine Orange, Y, 2G, 3G, R, RR	PK	CD
Pyrazole Orange G, R	S	CD

Name of Dye.	Agent or Maker.	Dye Method.
Pyrogene Black BD, B, BN, G, GE, GN, FF	Klp	Sulphur
Pyrogene Blue 2R, RM12, R	Klp	Sulphur
Pyrogene Brown G, 5G, M, R, V, B, D, O, OR, ORR, 4R	Klp	Sulphur
Pyrogene Cutch 2G, R, DG, DR	Klp	Sulphur
Pyrogene Dark Green B, 3B	Klp	Sulphur
Pyrogene Deep Black C	Klp	Sulphur
Pyrogene Direct Blue R, G	Klp	Sulphur
Pyrogene Gray B, G, R	Klp	Sulphur
Pyrogene Green B, FB, FF, 2G, 3G	Klp	Sulphur
Pyrogene Indigo	Klp	Sulphur
Pyrogene Olive N	Klp	Sulphur
Pyrogene Violet Brown SO, OR	Klp	Sulphur
Pyrogene Yellow M, 3R	Klp	Sulphur
Pyrol Black B conc. BB extra conc. G conc. X conc., ROO	L	Sulphur
Pyrol Blue Black	L	Sulphur
Pyrol Bronze	L	Sulphur
Pyrol Brown G	L	Sulphur
Pyronine B, G	Mz, Bs	WGS, SS, CT
Pyrosine, B, J	Mo	WGS
Pyrotine Orange	Bs	WGS
Pyrotine RRO	Bs	WGS
Quinoline Blue	G	Special
Quinoline Red	A	Special
Quinoline Yellow, Spirit	Mz, A	Special
Quinoline Yellow	Mz, A, By, PK, SS, WGS	
Red B	Math, PK	SW, CD
Red Blue crystals, powder	O	CT
Red C	PK.	
Red for Lake P	Mz	Lakes
Red 785	AC	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Red Violet RS, 4RS, 5R extra, 5RS	PK	WGS, SS, CT
Red, Y, YB, YG, Y2G	Mz	WGS, SS
Regina Purple, Violet	BrS.	
Regina Violet, alcohol, water soluble	A	WGS, SS
Renol Brown M	tM	CD
Renol Claret Red	tM	WA
Renol Dark Green N extra	tM	CD
Renol Green B	tM	CD
Resinate Blue A	Math.	
Resinate Green A	Math.	
Resinate Red A	Math.	
Resinate Yellow A	Math.	
Resinate Violet A	Math.	
Resoflavine	B	WCh
Resorcine Blue	Mz	Printing
Resorcine Brown	A	WGS
Resorcine Yellow	A, K	WGS
Resorgyl Yellow	RF	CD
Rheonine A, GD	PK	CT
Rhine Blue BH	Jy	CD
Rhodamine B, B extra, 3B, G, G extra	Mz, Klp, PK	WA, SA
Rhodamine 3G, 5G	Klp, PK	WA, SA, CT
Rhodamine 6G, 5G	Klp, PK	WA, SA, CT
Rhodamine 6G, 6GD, 6G ext, 6GD ext.	Mz	WA, SA, CT
Rhodamine 5G, 4G	By	WA, SA, CT
Rhodamine extra B, O, R	Klp	WGS, SS
Rhodamine S	Klp, PK	WGS, SS
Rhodinduline Red B	By	WGS, SS
Rhodinduline Red G, S	By	WGS, SS
Rhodinduline Violet	By.	
Rhodinduline 2BR, Pink, RIV	HS	WGS
Rhodine 2G, 3G, 12GF	BCF	WA, SA, CT
Rhoduline Blue R, GG extra	By	CT

Name of Dye.	Agent or Maker.	Dye Method.
Rhoduline Orange N, NO	By	CT
Rhoduline Heliotrope	By	CT
Rhoduline Heliotrope 3B	By	CT
Rhoduline Pink 4B	By	CT
Rhoduline Pure Blue BB	By	CT
Rhoduline Yellow 6G	By	CT
Rocelline	Kell, Klp, Math, SS,	WGS, SS
Rocelline N	Mz	WGS, SS
Rock Scarlet YS	BrS.	
Rosanthrene A, B, CB, O, R, AW, GW, RW	Klp	CDv
Rosanthrene Bordeaux	Klp	CDv
Rosanthrene Orange R	Klp	CDv
Rosanthrene Pink	Klp	CDv
Rosanthrene Violet 5R	Klp	CDv
Rosazeine O extra B, B extra, 4G	Mz	WA, SA, CT
Rosazeine 6G, 6G ext, 6GD, 6GD ext	Mz	WA, SA, CT
Rosazine	SS	WGS
Rosafond	RH	CD
Rosazurine, B, BB, G	Mz, By	CD
Rose Bengale	HM, Kell, Math, PK,	WA, SA
Rose Bengale AT	A, PK	WA, SA
Rose Bengale, B, 3B conc., G	Mz	WA, SA
Rose Bengale N	Math	WA, SA
Roseine	BrS.	
Roseline B, G, R	Mz.	
Rose Pink, bluish, yellowish	Klp	CT
Rose Rosanthrene	Klp	CDv
Rosinduline 2B Bluish, G, 2GB	K	WGS
Rosolane B, O, R, T paste	Mz	SA, CT
Rosolane	SS	WGS, SA

Name of Dye.	Agent or Maker.	Dye Method.
Rosol Red B Extra	By	CT
Rosol Scarlet G Extra	By	CT
Rosophenine	ClCo	CD, WGS, SS
Rosophenine R, ink	ClCo	CD
Rosophenine 4B, 5B, 6B	ClCo	CD
Rosophenine Geranine	ClCo	CD
Roxamine	DH	WGS
Royal Green crystals	Klp.	
Royal Violet R	Mz	CT
Rubidine	KB.	
Rubin, S	A	SA, CT
Ruby small crystals	KB.	
Rubramine	NI	CT
Ruffigallol	PK	WCh
Russia Red B, G	Mz, Math	CT
Russian Leather Red	Math, O.	
Russian Red B, BB, G, GP, N	O.	
Sabol Brown, or palmetto extract	Nat.	
Safraniline	Kell	WGS, SS, CT
Safranine	Mz, Kell, Klp, Math.	
Safranine AG, AGT extra	K	SA, CT
Safranine AN extra	Mz, Math	SA, CT
Safranine ANF	Mz	SA, CT
Safranine B best	Kell	CT
Safranine B conc.	Mz	CT
Safranine BS	Math	SA, CT
Safranine conc.	Mz	SA, CT
Safranine FB extra	PK	SA, CT
Safranine FF extra No. 0	By	SA, CT
Safranine G	O.	
Safranine G extra	A, Math	SA, CT
Safranine GGF, GGP	Math	SA, CT
Safranine GGS	Mz, Math	SA, CT

Name of Dye.	Agent or Maker.	Dye Method.
Safranine M	O.	
Safranine MN, NY	PK	SA, CT
Safranine NT	Math	SA, CT
Safranine O	Mz, Math	SA, CT
Safranine PK	Math	SA, CT
Safranine Purple	PK	SA, CT
Safranine RS, Resinate	Math	SA, CT
Safranine superfine, bluish, yellowish	Kell	SA, CT
Safranine S 150	Math	SA, CT
Safranine T	Math	SA, CT
Safranine Y	BrS, Klp.	
Safrosine	PK	SA, CT
Salicine Black AT, B, C, D, P, PT	K	WGSCh
Salicine Blue B	K	WGSCh
Salicine Blue Black A	K	WGSCh
Salicine Bordeaux R	K	WGSCh
Salicine Brown B, R, RC	K	WGSCh
Salicine Chrome Brown S, T	K	WGSCh
Salicine Orange GR	K	WGSCh
Salacine Yellow, G, 2G, D	K	WGSCh
Salmon Red	A, NI, PK	CD
Scarlatol B	Mz	Lakes
Scarlet B	Math	
Scarlet B extra	Mz	WGS, SS
Scarlet Cardinal	PS	
Scarlet EC, FR, FRR, FRRR, for cotton	Math	CAl
Scarlet G, GG, GL, GR11, GV	Mz	WGS, SS
Scarlet BR	A	WGS, SS
Scarlet GRCL	Mz	WGS
Scarlet NR, NRR	SS	WGS, SS
Scarlet R	Mz, By	WGS, SS
Scarlet RBC	Mz, Math	WGS, SS

Name of Dye.	Agent or Maker.	Dye Method.
Scarlet RL	Mz	WGS, SS
Scarlet 2R	Mz, Klp	WGS, SS
Scarlet 2RCL, 3RCL	Mz	WGS
Scarlet RRL	Mz, Math	WGS, SS
Scarlet RVL	Mz	WGS, SS
Scarlet 3R, 3RL, 4R, 5R	Mz	WGS, SS
Scarlet 6R Crystals	Mz	WGS, SS
Scarlet S	Math	WGS, SS
Sea Blue	SS	WGS, CT
Seal Brown G	SS	CD
Serge Blue	O.	
Setocyanine	Kell	SS, CT
Setoglaucine	Kell	SS, CT
Setopaline	Kell	SS, CT
Sevres Blue	S	Printing
Silk Black A	H	SS
Silk Blue	Mz	SS
Silk Blue extra greenish, J8C, IC, T, 5BNOO, T5B, T3B, TB, TR, TRL	O	SS
Silk Gray O	Mz	SA
Silk Induline B	Mz	SS, CT
Silk Scarlet TB	H	SS
Silk-Wool Black 3B, T	Mz	WA
Silver Gray N	Math	
Sky Blue	JB	
Smaragd Green	By	
Solamine Blue B, R, FF, BF	A	CD
Solar Black	AT	CD
Solid Blue	O	
Solid Blue BB, BD, BL, DD, RR	AT	CD
Solid Blue BD, BRD, 2BD, 3RD, 6G	Math	WGS
Solid Blue BL	At.	
Solid Blue R	Math	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Solid Blue 3R	Math	WGS
Solid Brown O yellowish, L, NT	Mz	WGS, SS
Solid Green crystals, O, A1, 72780	Math.	
Solid Gray S	Math.	
Solid Green G	Klp.	
Solid Green J	SS.	
Solid Green JJ0, O	Klp	WGS SS, CT
Solid Green O paste	Mz	WCh
Solid Violet	Klp	WCh
Solid Yellow N	SS	WGS
Soluble Blue	Mz, Bs, BrS, Math	SS
Soluble Blue A1	O	CT
Soluble Blue B	Bch.	
Soluble Blue 8B, 10B	BrS.	
Soluble Blue Cl, C3	Sch	CT
Soluble Blue, J, M, 00	O	CT
Soluble Blue R	Sch	CT
Soluble Blue BV, 3B	O	CT
Soluble Blue R	Mz.	
Soluble Blue 3R	Mz, O	CT
Soluble Blue SV	Mz.	
Soluble Blue XG, XL	BrS.	
Sorbin Red, G, BB	PK	WGS
Soudan Red I, II, III, G, R	A.	
Soudan Black 1, 2, 3, B, R, 2R	SS	WGS
Soudan Brown	A	CD
St. Denis Black B	SS	Sulphur
St. Denis Red	SS	CD
Stanley Red	ClCo	WGS, SS
Sterosine Gray	H.	
Stilbene Orange 4R	ClCo	CD, SS
Stilbene Red	A.	
Stilbene Yellow G, 3G, 6G, 8G, 4G	ClCo	CD, SS

Name of Dye.	Agent or Maker.	Dye Method.
Substantive Pink CR	PK	CD
Sudan I, II, III	A, Jb	Special
Sudan G	A, Jb	Special
Sudan Brown	A, Jb	Special
Sulfamine Brown A, B, D 93	Bs	WCh
Sulfanilin Black B, G	K	Sulphur
Sulfanilin Brown P	K	Sulphur
Sulfogen S, MO	L	Sulphur
Sulphin	PK	CD
Sulpho Black	H	Sulphur
Sulpho Black G, R	By	WGS
Sulpho Cyanine G, 3R, 5R, GR	By	WGS, WCh
Sulpho Cyanine Black B, 2B	By	WGS
Sulpho Green	S	WGS
Sulpho Yellow S	K.	
Sulphogene Blue M	At	Sulphur
Sulphon Acid Black 2B	By	WGS
Sulphon Acid Blue B, R, 3R ext G	By	WGS
Sulphon Acid Brown 2R, 4R	By	WGS
Sulphon Acid Green B	By	WGS
Sulphon Azurine D	Mz, By	WA, CD
Sulphon Orange G	By	WGS
Sulphon Yellow G, 5G, R	By	WGS
Sulphon Yellow 5G, R	By	WGS
Sulpho Rosazeine B, B extra, G, G extra	Mz	WGS
Sulphur Black T, T extra, A	A	Sulphur
Sulphur Black AW extra, 2B ex, TB ex, 4B	A	Sulphur
Sulphur Black L, N, ST	Mz	Sulphur
Sulphur Blue L extra, D, B extra, R extra	A	Sulphur
Sulphur Bronze	Mz	Sulphur
Sulphur Brown G, 2G, O, OB extra	A	Sulphur

Name of Dye.	Agent or Maker.	Dye Method.
Sulphur Brown TBG, TBM	Mz	Sulphur
Sulphur Corinth B	A	Sulphur
Sulphur Cutch G, R	A	Sulphur
Sulphur Green G extra	A	Sulphur
Sulphur Indigo B	A	Sulphur
Sulphur Olive B, FF extra	A	Sulphur
Sulphur Yellow R ext, 4G	A	Sulphur
Sulphurol Black BT, GT	D	Sulphur
Sultan Violet	H	CD
Sun Yellow	Mz, A, By, Kell, Klp.	CD
Superfine Violet	KB	
Superior Violet	KB	
Superior New Green Crystals	KB	
Supramine Black BR	By	WGS
Supramine Brown R	By	WGS
Supramine Red GG	By	WGS
Supramine Yellow R	By	WGS
Swiss Black B, BG, B2G, C, DG, D	SW	
Tabora Black R extra	Mz A	CD
Tannin Brown B	Math	CT
Tannin Heliotrope	Math	CT
Tannin Indigo	Math	CT
Tannin Orange R paste, powder	Klp.	
Tartrazine	Mz, Klp, PK	WGS
Tennyson Red	H.	
Terra Cotta	BL	WGS
Terra Cotta F, NF, NFG, X	Kell	CD
Terra Cotta R	Kell	WCh
Tetranil Brown R conc.	NYB	CD
Tetrazo Blue, 6B, 4R, RW, BX	NYB	CD
Tetrazo Brilliant Blue BB, RR, 6B	NYB	CD
Tetrazo Brilliant Green J, GDD	NYB	CD
Tetrazo Chlorine Scarlet B	NYB	CD

Name of Dye.	Agent or Maker.	Dye Method.
Tetrazo Cutch Brown	NYB	CD
Tetrazo Dark Brown	NYB	CD
Tetrazo Indigo Blue D	NYB	CD
Tetrazo Lemon Yellow	NYB	CD
Tetrazo Pink B	NYB	CD
Tetrazo Purpurine R	NYB	CD
Tetrazo Sulphur Black, extra, 2B ext, R extra	NYB	Sulphur
Tetrazo Sulphur Brown G, 3R	NYB	Sulphur
Tetrazo Sulphur Green D, 2Y, 3Y	NYB	Sulphur
Tetrazo Sulphur Indigo B	NYB	Sulphur
Tetrazo Sulphur Yellow		
Tetrazo Yellow CH, R	NYB	CD
Thiamine Yellow	BrS.	
Thiazine Brown G, R	PK	CD
Thiazine Red G, R	PK	CD
Thiazol Yellow 3G, GL	By, A	SA, CT
Thio Brown 2B, R	Bs	CD
Thio Carmine R paste, powder	Math	WGS, SS
Thio Catechine S, 1, 2, 3, 4	SS	Sulphur
Thio Chromogene	Mz, Bs	CDv
Thio Cyanosine	Mo.	
Thio Flavine S	Math	CD
Thio Flavine T	Math	CT
Thiogene Black D	Grie	Sulphur
Thiogene Black NA, NB, T, BB conc., M conc., MR conc., 4B conc., 5B conc., MM conc., BR conc., MMR conc., MMG conc., M ext. conc., MM ext. conc., BR ext. strong, M extra strong, MA extra strong	Mz	Sulphur
Thiogene Black M liquid, BB liquid, BR liquid, B2R liquid, B3R liquid	Mz	Sulphur

Name of Dye.	Agent or Maker.	Dye Method
Thiogene Blue B, R, RR	Mz	Sulphur
Thiogene Bronze G	Mz	Sulphur
Thiogene Brown R, G, GG, GC, GR, GRR, S, RR, 3R	Mz	Sulphur
Thiogene Catechu R	Mz	Sulphur
Thiogene Coal Black O conc.	Mz	Sulphur
Thiogene Cyanine G, O, B	Mz	Sulphur
Thiogene Dark Blue B, BT, BTL	Mz	Sulphur
Thiogene Dark Red R, G	Mz	Sulphur
Thiogene Deep Blue B conc., B ext. conc., BR conc., BR ext. conc., RL conc., 2RL conc.	Mz	Sulphur
Thiogene Diamond Black B, V	Mz	Sulphur
Thiogene Gold Yellow A conc., AO	Mz	Sulphur
Thiogene Green B, BL extra, GG, GL extra	Mz	Sulphur
Thiogene Heliotrope O	Mz	Sulphur
Thiogene Khaki O, N conc.	Mz	Sulphur
Thiogene Navy Blue R	Mz	Sulphur
Thiogene New Blue BL, JL, 2RL	Mz	Sulphur
Thiogene Olive GG, GGN	Mz	Sulphur
Thiogene Olive Green B, G	Mz	Sulphur
Thiogene Orange OG, R, RG, RR	Mz	Sulphur
Thiogene Padding Black M liquid	Mz	Sulphur
Thiogene Rubine O	Mz	Sulphur
Thiogene Violet V, B	Mz	Sulphur
Thiogene Yellow Brown OG	Mz	Sulphur
Thiogene Yellow G, GG, 5G, GH, GH conc.	Mz	Sulphur
Thio Indigo Brown G	K	Vat
Thio Indigo Orange R	K	Vat
Thio Indigo Red B, BC, 3B	K	Vat
Thio Indigo Scarlet R, G, GG	K	Vat

Name of Dye.	Agent or Maker.	Dye Method.
Thio Indigo Violet K	K	Vat
Thion Black BE, TG, 3L	K	Sulphur
Thion Blue B, conc.	K	Sulphur
Thion Blue Black G	K	Sulphur
Thion Brown G, R, O, 3R, T	K	Sulphur
Thion Direct Blue THB	K	Sulphur
Thion Green B, 2G	K	Sulphur
Thion Olive 2G	K	Sulphur
Thion Violet Black	K	Sulphur
Thion Violet Brown 3R	K	Sulphur
Thion Violet B, R	K	Sulphur
Thional Black T, TB, TR	S	Sulphur
Thional Brilliant Green GG	S	Sulphur
Thional Bronze	S	Sulphur
Thional Bronze G	S	Sulphur
Thional Dark Brown M	S	Sulphur
Thional Green GG	S	Sulphur
Thional Yellow G, 3G	S	Sulphur
Thionol Black GTXAS, BC	Lev	Sulphur
Thionol Brilliant Green G extra	Lev	Sulphur
Thionol Brown 2R	Lev	Sulphur
Thionol Green B, 2B, 2G	Lev	Sulphur
Thionine Blue G0	Mz	WN, SA, CT
Thionine Blue 0, 00, 000	Mz	WN, SA, CT
Thio Orange G	Bs	WGS
Thiophenol Black T extra, 2 B ex, 2 R ex, G ex, BF ex	Klp	Sulphur
Thiophor Catechu	CJ	Sulphur
Thiophor Olive BG	CJ	Sulphur
Thio Phosphine J	LP.	
Thio Ruby	Bs	WGS
Thio Vesuvine	Bs	WGS
Thioxine Brown R, 5G, G, GR, 2BG, 2BR, G2R	O	Sulphur

Name of Dye.	Agent or Maker.	Dye Method.
Thioxine Dark Blue B	O	Sulphur
Thioxine Indigo B	O	Sulphur
Thioxine Orange R	O	Sulphur
Thioxine Yellow G	O	Sulphur
Thio Yellow G, RM, R	Bs	CD
Thomas' Fast Black Nos. 44, 55	GP	SN
Thomas' Fast Egyptian Stain	GP	CD
Thomas' Fast Yellow 24	GP	CD
Titan Black ED	H	CD
Titan Blue B, BBB, S	H	CD
Titan Brown O, R	H	CD
Titan Como G, R, S	H	CD
Titan Gold, Gray, Navy Blue, Navy R, Orange N, Pink, Red, Red 6B, Scarlet C, Scarlet CB, Scarlet D, Scarlet S, Sky Blue, Yellow H, Yellow R, Yellow Y	H	CD
Tobacco Brown G, R	Math	CT
Tolan Red I, II, B	K	WGS
Tolamine Green, Violet	Klp	CD
Toledo Blue O	Bs	CD
Toluidine Blue O	A, O, PK	CT
Toluylene Black G	O	CD
Toluylene Blue B, R	O	CD
Toluylene Bordeaux B	O	CD
Toluylene Brown, G, R	O	CD
Toluylene Dark Blue B, R, GN	O	CD
Toluylene Fast Brown 3G, 2R	O	CD
Toluylene Fast Orange	By	CD
Toluylene Orange R	Mz	CD
Toluylene Orange G, R, RR	O, A	CD
Toluylene Red or Neutral Red	O	CD
Toluylene Yellow, SG	O	CD
Tolyl Black B, BB, BG	Mz	WA

Name of Dye.	Agent or Maker.	Dye Method.
Tolyl Blue, SB, SR, ST, GR ext., 5R ext.	Mz	WA
Toraline B, a logwood preparation.		
Triamine Black B, BT, MJ	Klp	CD
Triamine Blue BNW, MJ, MNW, TNW.	Klp	CD
Trianisoline	Mo	CT
Trazol Black B	O	CD
Triazol Blue BB	O	CD
Triazol Blue BB, 3R, 4B	O	CD
Triazol Bordeaux B	O	CD
Triazol Brown E, N, A, B, G, GOO, SOOO	O	CD
Triazol Corinth B	O	CD
Triazol Dark Blue B, 3R, GW	O	CD
Triazol Fast Yellow 2G	O	CD
Triazol Indigo Blue	O	CD
Triazol Red 6B, 10B	O	CD
Triazol Violet R, B new, RR	O	CD
Trisulphon Blues	S	CD
Trisulphon Browns	S	CD
Triton Black R	O	CD
Trona Red 3B, 7B, 2G	By	CD
Tropaeoline D, G	Math	CD
Tropaeoline R, Y, RN, RNP	Math	WGS, SS
Tumerine 914	Math	WGS, SS
Turquoise Blue BB, G	By	CT
Tyemond Orange RY	H	WGS
Tyemond Scarlet SJ	H	WA
Tyemond Scarlet Y	H	WGS
Ultra Violet LGP	S	Printing
Union Black B, BB, S, P, BG, A	Math	CWD
Union Black SM, BS	Mz	CWD
Union Black B, D, G	H	CWD
Union Black 2BNI	B	CWD

Name of Dye.	Agent or Maker.	Dye Method.
Union Blue DC, XX	Math	CWD
Union Blue R	A	CWD
Union Blue RH	H	CWD
Union Green	Sch	CWD
Union Navy Blue	Sch	CWD
Union Royal Blue 2G, RX	H	CWD
Urania Blue, B	Bs	WGS, SS
Uranine	Mz, A, BrS, Math, PK.	
Ursol D, P	Z, A	Fur
Vacanceine Blue, Scarlet	H.	
Vat Red B paste, powder	B	Vat
Vesuvine B, BB, 3BM, conc., 4GB conc., extra yellow, O, RV, 2RV, 3R, superior	Mz	WG, SS, CT
Vesuvine B	PK	WG, SS, CT
Victor Black	At	WGS
Victoria Black B, G, 5G	By	WGS
Victoria Black	Mz	Wool
Victoria Blue B	Mz, Kell, Klp, Math, PK	WG, SS, CT
Victoria Blue BS, alcohol soluble	Klp, PK	WG, SS, CT
Victoria Blue R, 4R	Kell, Klp, PK,	WGS, SS, CT
Victoria Green 3B	Klp, PK	WGS, SS, CT
Victoria Heavy Blue	By	WGS
Victoria Pure Blue	B	WGS
Victoria Rubine G, O	Mz	WGS, SS
Victoria Ruby	Mz	WGS, SS
Victoria Scarlet G, R, 2R, 3R, 4R, 5R, 6R	Mz	WGS, SS
Victoria Violet B, paste	Mz, PK	WCh
Victoria Violet 4BS	Mz, By	WGS
Victoria Violet 8BS, 4BSL, RL	Mz	WGS, SS

Name of Dye	Agent or Maker.	Dye Method
Victoria Yellow, A, O	Mz	WGS
Victoria Yellow, conc.	Mz	WGS
Vidal Black S, D	SS	Sulphur
Vidaline Blue, BB, 5B, R, RR	SS	Sulphur
Vidaline Brown B, GG	SS	Sulphur
Vidaline Green	SS	Sulphur
Vigoureux Black I	Mz	Printing
Vigoureux Black S	Math	Printing
Vigoureux Brown B, N, SW, V	Math	Printing
Vigoureux Brown I	Mz	Printing
Vigoureux Fast Black B, T, C	Mz	Printing
Vigoureux Gray I	Mz	Printing
Vigoureux Green B	Math	Printing
Vigoureux Red A	Math	Printing
Vigoureux Red I	Mz	Printing
Vigoureux Yellow I	Mz	Printing
Vilal Black	HSV	Sulphur
Violamine B, 3B, G, R, A2R, BE, RGE, RBE	Mz	WGS, SS
Violanthrene B, BS, CD paste	B	Vat
Violet APF	SS.	
Violet 5B, 6B	By	CT
Violet R, RR	Mo.	
Violet 7B	KB.	
Violet 0B	AC	WGS
Violet Black	PK.	
Violet 5R	By	WGS, SS, CT
Violet Blue AP	SS	WGS, SS, CT
Violet C	SS	WGS, SS, CT
Violet 4RN	Klp	WGS, SS, CT
Violet 3S0N	SS	WGS, SS, CT
Violet Resinate A	Math.	
Violet 118	HS	WGS

Name of Dye	Agent or Maker.	Dye Method.
Viridanthrene	B	Vat
Viridone FE	Mz	Printing
Vulcan Brown D, G	Klp	Sulphur
Walnut Brown A, B	Math	CT
Water Blue	Mz, By, Kell, Klp, Math, O, PK, Sch.	
Water Blue B	Math	SS, CT
Water Blue 3BA, 2BM, BNW	A	SS, CAL
Water Blue 6B extra	O	CD
Water Blue BS, R, RB	Math	SS, CT
Water Blue R, RC, 2R, ADR, 4RW, 5RW	A	SS, WGS, CAL
Water Blue L	A	SS, WGS, CAL
Water Blue 00	K	SS, CT
Water Rose B	Klp	WGS, SA
Water Soluble Eosine	Klp	WGS, SS
Wood Violet S	PK	WGS
Wool Black	A, PK	WGS
Wool Black B	A, Bs	WGS
Wool Black 4B	A, ACW	WGS
Wool Black 4BF	A	WGS
Wool Black 6B	A, BS	WGS
Wool Black 6BW	A	WGS
Wool Black DG, DN	K	WGS
Wool Black GR	A	WGS
Wool Black WC	At	WGS
Wool Blue AF	Fi	WGS
Wool Blue B, 2B, R, 5B	A	WGS
Wool Blue FS	Mz	WN
Wool Blue K	PK	WGS
Wool Blue N, R extra, 5R, B ex SR ex.	By	WGS
Wool Blue S	PK	WGS
Wool Blue SS	Kell	WGS

Name of Dye	Agent or Maker.	Dye Method
Wool Discharge Black T	Mz	WACh
Wool Fast Blue BL, GL	By	WA
Wool Gray	Bs	WGS
Wool Gray, B, B double G, R	Klp	WGS
Wool Green B, BS	By, Klp	WGS
Wool Green S	Klp, PK	WGS
Wool Green SS	Kell	WGS
Wool Induline B	K.	
Wool Jet Black 2B, 3B	A	WGS
Wool Printing Black B	L	Printing
Wool Printing Black NB	Mz	Printing
Wool Red B	Math	WGS
Wool Red extra	K	WGSS
Wool Red R, G	PK	WGS
Wool Scarlet 3R	CDC	WGS
Wool Scarlet R, 4R, 37W	Sch	WGS
Wool Violet R	K	WA
Wool Yellow	PK	WGS
Xanthine	Mz, Klp	SS
XL Acid Eosine 3B, 5B	H	WGS
XL Blue	H	WGS
XL Navy Blue	H	WGS
XL Red	H	WGS
Xylene Blue BS, VS, AG, AR, VG, VR	S	WGS
Xylene Red B	S	WGS
Xylene Yellow 2G, 3G	S	WGS
Xylidine Ponceau, see Ponceau 2R.		
Xylidine Red, see Ponceau, 2R.		
Yellow AT	Math	WGS
Yellow Coralline.		
Yellow Fast to Soap	SS.	
Yellow for Leather, O, 2a, 7, 11, G	Mz	Tannin
Yellow Resinate A	Math.	

Name of Dye	Agent or Maker.	Dye Method.
Yellow T	Klp	WGS, SS
Yellow W	By	WGS, SS
Yellow W R	Klp	CD
Yellow 5183, 521	HS	WGS
Yellow II	Math.	
Yellow N	RH.	
Zambesi Black D	A	CD
Zambesi Black B, BR, D, F, FO	A	CDv
Zambesi Black 2G, NA, V	A	CDv
Zambesi Blue B, BX, R, BX	A	CD
Zambesi Brown G, 2G	A	CD
Zambesi Gray B	A	CD
Zambesi Indigo Blue R	A	CD
Zambesi Pure Blue 4B	A	CD

PART VII
Miscellaneous Notes

Miscellaneous Notes

THE CHEMIST IN AMERICAN INDUSTRY.

AN ADDRESS BY THE AUTHOR IN BOSTON.

We ought to have more chemistry in our industries. We have been working a great many years empirically and practically and without a knowledge of why. Our practical men know how but not why, and it is the technical man that knows how and why, and he is the man we want in our factories and mills.

I am not going to take a personal view of this at all, because I am a textile manufacturer as well as a chemical man or a dyestuff man. I happen to have a mill in Massachusetts. I am sorry it is in Massachusetts since one of your laws went into effect here; but I am not going to move it. I am going to come occasionally and look after it.

Nevertheless, the textile industry is the industry that has fostered chemistry. I am not speaking of inorganic chemistry. I am not speaking of the manufacture of acids in a large way, but I am speaking of the highly developed and organized chemistry—the manufacture of dyestuffs in particular, which interests us all and about which we hear a great deal with reference to fostering the industry. The Germans have got that industry. It is fifty years ago—fifty-two or fifty-three years ago, to be exact—that the first aniline colors were discovered in England. England had a monopoly at first: England has lost it. France came along, France lost it and Germany has got it. We claim to manufacture on this side. I have a factory; it is a

joke, but it is a factory just the same. It is not a joke in the fact that it doesn't pay, you know, that is serious, but I mean as compared to a factory in the sense of an industry.

There are some things we make here and make them well. But let us take this matter of dyestuffs. We are importing these things from Germany. Germany has given time and attention. The German is a plodder. He is a natural-born investigator. We get a chemist into a mill and if he does not discover something in six months we fire him. He has got to discover something. We don't give a man a chance to go in and spend his life practically in charge of scientific work. We do not have any chemical industry in this country. We are pirates; we have stolen some things and they are getting around, but we have not developed anything in the chemical line. As a matter of fact, let me say to you, there has not been one factory anywhere in the world, not even in Germany, started within twenty years making these compounds. It has developed gradually in the hands of a few concerns that have become enormous. And when we talk about building up an industry we do it, we claim, as a protection for labor. The chemical industry requires less labor than any other industry in the world. And if it will not bore you, I am going to give you a few figures.

We talk about controlling manufacture on this side of the ocean. It is a grand thing. We grant patents to foreigners and they do not have to operate under them in this country. Formerly we did not have to operate in Germany. We had a perfect right to hold patents in Germany without operating, and so it became a matter of policy to make us manufacture in Germany, and they were going to enforce the law. Then we found there were hundreds and thousands of American patents held in Germany that were not being worked, and then the conditions changed. Most of the patents on mechanical toys, musical toys, and phonographs are held by Americans. Those people have now got to manufacture in Germany, and so it is said that the Germans should come here to manufacture. Who says so? A

few theorists. And if they did so, let us see what it would amount to in the dyestuff industry. There are three large plants about on a level and I don't believe any one of them employs, all told, over 8000 or 9000 hands. There are probably thirty smaller plants, but I will guarantee there are not 50,000 workmen employed in the entire industry in Germany that manufactures for the entire world.

Now, what would it amount to if we made all our dyestuffs in this country? There would not be 10,000 people employed in the United States to make all our stuff if we made it all ourselves. And who would pay for it? There would be more people employed on the commercial side, the merchandizing, and distributing, and that is our great expense here. And who would pay for it? The manufacturer, the consumer on this side, the man who is using these things and puts them in his finished material and then tries to export.

Now, what is the use? We need the chemist, we ought to have the chemist to reduce our processes and to teach us to use every scientific means we can. But when we talk about undertaking to make the things here that we get from Germany, I say, let us alone; we are doing well enough. We are paying no more than they are in Germany and every dollar's worth of tariff put on is just so much added to the cost. The duty does not reduce the price here; on the contrary, it gives the American manufacturer a chance to bolster his prices. You have got to pay duty on the foreign price, no matter what it is, and you save nothing that way. I mention this because it was touched on in the last tariff bill. I took a stand against it and I believe the manufacturers ought to realize that situation.

The dyestuff interest is dependent mostly upon the textile industry for the demand for its product. We used to use a few colors outside in food products before Wiley got on the job and stopped it. But it is the textiles that take the dyestuff, and I believe that the manufacturer ought to realize, and Mr. Bennett has known for twenty-five years that he has been in

touch with it, what a change has taken place. The natural products have been driven out one by one. To-day the only one left that is not made in the laboratory is logwood, and it is only a question now when that will be going. It is largely replaced by wool, and it will soon disappear altogether. Indigo is gone, madder is gone, all the old natural dyestuffs have been replaced one by one. Conditions are improving and prices coming down gradually and faster colors being developed until, today, we have got a full and complete line. They cannot be made here. And then this knowledge which is gained in the laboratory is an invaluable factor. The young chemist coming out of the school is very good, but he needs experience. They have got it over there; they have had it. Within fifty years a concern that I have in mind has grown from three employees to 7000.

I am going to give you those figures. It will only take a moment and these are the figures of one of the three plants.

In this plant there are 7210 employees at work, 360 foremen and 282 chemists. Now, imagine an American plant with over half a dozen chemists anywhere. There is not one, excepting chemical works, with half a dozen chemists. Sixty-three technical men are employed, including engineers, etc., and the commercial department, excluding the selling staff, employs 585.

Of real estate, there are 470 acres, of which 78 acres are under roof, with 35 miles of railroad track in the plant, with 77 houses for officials, and 800 houses for workmen. There are 151 boilers with a heating surface of 208,250 square feet; 238 steam engines with 16,240 horsepower; 78 electric motors of 8750 horsepower. The daily consumption of coal is 750 tons; water 21,250,000 gallons; gas 516,500 cubic feet; ice 1,000,000 pounds a day and that is not all for highballs either. They use ice for cooling various things, I suppose.

The yearly shipments by railroad are: incoming, 173,600 tons; outgoing, 124,500 tons; by water: incoming, 268,000 tons; outgoing, 61,700 tons.

Now, that gives you some idea of the volume of business done with that relatively small number of workmen. Now, multiply that by three or even four, say, to get the number employed in the large establishments, and allowing as much again for the smaller concerns, you have about 50,000 people employed in the entire industry that supplies the entire world.

The plants in England, France, and Russia, where they have to have plants to protect patents, do not amount to anything. The English passed the law, if you remember, compelling operation, and the German manufacturers of dyestuffs had to build plants in England. The expectation was that they would buy up some of the old English plants. But they did not. The Germans built their own plants and the English are paying the cost of the stuff manufactured in England with the organization of the new plant tacked on. They have not employed 350 workmen all together in England.

THE DYES OF THE ANCIENTS.

Before considering dyes or their origin, one naturally turns to find out what kind of material the ancients had to operate on. The weaving of material is the oldest art in the world.

Adam and Eve are assumed to have lived 6000 B.C., and the tombs of Thebes are estimated to have been in use 3000 to 4000 B.C., and on mummies taken from these tombs Indian muslin has been found, so that at a very early age weaving had reached a high stage of perfection.

It is said that a Hindoo invented the first loom, and there can be no doubt that there was communication between India and Egypt at a very early period. At any rate, the art of making fine linen and cloth was not new when Moses fled from Egypt. There are many references in the Old Testament to woven fabrics.

Leviticus, chapter xiii, verses 47 and 48, read: "The garment also that the plague of leprosy is in, be it a woolen garment or a linen garment. Whether it be in a warp or in the woof of linen, or of woolen, whether in a skin, or anything

of skin." The Book of Leviticus is assumed to date about 1490 B.C. In Ezekiel mention is made of the white wool which was brought from Damascus to be sold at the fairs of Tyre previous to its being dyed into the famous Tyrian purple.

As early as 900 B.C. in India where raw material, especially cotton, was abundant according to unanimous testimony both of history and tradition, weaving was a most important industry and a great variety of cotton fabrics are mentioned in history, for example, we read of the finest Bengal muslins, of coarse middle and fine cloths, either plain or striped, of coarse and fine calicos, of colored purple goods, as well as pieces of gold embroidery, of spun silk, and furs. The white cotton garments of the Hindoo were copied by the Greeks because of their extraordinary whiteness.

In the writings of Plato (400 B.C.), mention is made of one of the most important differences between warp and weft, viz., that the threads of the former are strong and firm in consequence of being twisted in spinning, while the weft is softer and more yielding. It appears, therefore, that the fabrics of those days had reached a very high pitch of perfection.

It is not so easy to trace the history of dyes and dyeing, as there is much contradiction among the ancient writers. To the writings of Homer, Theophrastus, Discorides, and their transscriber, Pliny, we are indebted for our information of dyes. Pliny's "Natural History," the only one of his books saved to the modern world, is really an encyclopædia, and his information is so vast that he must have culled it from all of the ancient writers before the birth of Christ, hence there is a certain confusion of statements difficult to reconcile. Pliny was born about the year of the birth of Christ and died in 68 A.D.

It is difficult, therefore, to determine to which of the nations of antiquity we are indebted for the invention of the art of dyeing, but it is probable that dyeing was first practised by the Indians and from them the Phœnicians, the Egyptians, and the Hebrews learned and supplemented the art.

Colored stuffs are mentioned in various parts of the Pentateuch, and there is no doubt that the art was practised at a very early period by the Egyptians.

That the colored cloths and rich apparel mentioned in Ezekiel as being brought to Tyre from Babylon and distant countries were of Indian manufacture can scarcely be doubted. In the history of Babylon (550 B.C.), mention is made of the beauty of the dyeing of the Indian garments brought into Persia, these surpassing anything the Persians could produce.

In Pliny, special mention is made of the Indian Lacca, an insect of the Cochineal family, but not so valuable. Lac has been known from time immemorial in the East, but only comparatively recently in Europe. The name Lac is the same as the numeral Lakh (a hundred thousand) and is an indication of the countless numbers of the insects which made their appearance with every successive generation. That Babylon had a highway through the Persian Gulf is undoubted, hence all the Indian dyes and commerce found their way into Persia.

In Genesis, chapter xxxvii, verse 3, we find: "Now Israel loved Joseph more than all his children, because he was the son of his old age, and he made him a coat of many colors." Supposed date of 1723 B.C.

In the Book of Exodus, chapters xxv and xxvi, our Lord instructed Moses as to the furnishing of the Tabernacle, and at verses 4 and 5 the colors of the curtains are given: "And blue and scarlet, and fine linen, and goat's hair and rams' skins dyed red." The blue was probably an azure or sky color dyed from the hyacinth, but the identification is uncertain. There is no reason why it should not have been indigo.

Exodus xxxv, verse 25, reads: "And all the women which were wise hearted did spin with their hands, and brought that which they spun both of blue and of purple and of scarlet and of fine linen."

It has been proved that the blue material taken from the tombs of Thebes was dyed with indigo, and it is reasonable to

suppose that the indigo referred to in Exodus may also have been indigo which was thus probably employed to dye the Tabernacle curtains.

The purple was produced from the Purpura and Murex which are species of shell-fish and was identical with the costly and celebrated Tyrian purple.

This royal color assumed great importance in the Greek and Roman empires, as the following extract shows: "It is for this color, the fasces and axes of Rome make way in the crowd: it is this that distinguishes the senator from the man of equestrian rank: it is this that asserts that majesty of childhood; by persons arrayed in this color are prayers addressed to propititate the gods; in every garment it sheds a lustre and in the triumphal vestment it is to be seen mingled with gold."

On the same subject Pliny writes: "Pearls may be looked upon nearly as an everlasting possession, of everlasting duration. They descend from man to man and they are alienated from one to another just like landed estate, but the colors which are extracted from the Murex and the Purpura fade from hour to hour, and yet luxury which had similarly acted as a mother to them has set upon them prices almost equal to those of the pearls."

Frequent mention is made of the Murex in the Bible. Tyre became famous for it. It is in fact a royal color and "to be clothed in the purple" in modern language means being endowed with all worldly goods. From the beginning of the Roman Empire purple was used, and Romulus is said to have introduced it into the toga where the purple ornament was worn in horizontal stripes. A writer in the reign of the Emperor Augustus (first century) gives us some idea of the cost of purple in the following: "In the days of my youth the violet purple was in favor, a pound of which used to sell at one hundred denarii, and not long after the Tarentine red was all the fashion. This was succeeded by the Tyrian double-dyed cloth or twice dipped, which could not be bought for less than one thousand denarii."

The denarius was a silver coin of the value of 8-½d., so that the cost per pound for the Murex was 70s., and for the double-dyed cloth thirty-five pounds sterling in modern money.

The scarlet of the Tabernacle curtains was produced from what ancients called Kermes berries, and until 1714 A.D. belief in its vegetable origin remained, when the discovery was made that the dyeing power was due to an insect. Kermes was known by the Egyptians before the days of Moses, and was said to have been discovered by the Phœnicians. By the Hebrews it was called Tola, and by the Egyptians Wormdye. By the Persians the color was more sought after than purple.

Here is an ancient recipe for dyeing with Kermes: "To dye worsted with Kermes the material is first boiled for half an hour with bran in water, and then for two hours in a bath containing one-fifth of Roman alum and one-fifth of tartar, to which some sour water has been added. It is then taken out and laid in a linen bag for some days in a cool place and it is then dyed. In order to obtain a fuller shade, it is again dyed in a warm bath containing as much Kermes as was equal to three-fourths or even the full weight of the worsted used." Kermes belongs to the Cochineal family and was used until the advent of the American dye, which, with its superior brightness and strength, put Kermes out of the market.

Homer describes the rams of Polyphemus as having a violet-colored fleece and Pliny and Aristotle mention the same. A passage in Virgil suggests that the wool of the sheep became redder through eating of the madder root.

One writer says blue was dyed from the herb Hysginus, and yet Pliny writes of the dye Hysginus, a bulbous root grown in Gaul, as used to produce a deep red or puce color. The authentic facts remain that here we have, 1500 years before Christ was born, positive proof of blue, purple, scarlet, and red dyes.

Of madder, Pliny writes: "That little is known to any but the sordid and avaricious and this because of the huge profits which are derived from it." Still this is sufficient proof of its

existence and use, and from the same author we find a description of the Egyptians producing various colors in one dye bath with the use of mordants which gave fast colors and which point with certainty to madder.

Saffron was said to be known to the Chinese. It was certainly known to the Egyptians and to the Greeks, and is probably one of the oldest known coloring matters. In the Greek and Roman period it was also used as a scent. The Latin word *crocus* signifies the sample plant.

The Egyptians also used the bastard saffron or safflower to dye silk, to which it gave a brilliant but very unstable scarlet. Samples of cloth dyed with safflower have been found in the tombs of Thebes. In early Greek times it was used as a royal color, and even in ancient Ireland, and up to the seventeenth century the king's mantle was dyed with it.

Indigo: The use of indigo as a dye was practised by the Indians long before the days of the Greek and Roman Empires. In fact, there is undoubted proof of its use in 3000 B.C. in a garment taken from Thebes which has been tested and proved to have been dyed with indigo. The Greeks and Romans imported and used it as a dye and as a pigment for painting. Most kinds of blue pigment then in use were indigo in some shape or form and we find the Greek writers called it indicon, and Pliny indicum. Pliny gives a test by fire for it, as adulteration with earth seemed to be common on account of its costliness. All the writings of the ancients on indicum seem to agree perfectly with our indigo. It is indigenous to India, but from time to time and in every country, we find mention of it. It is never spoken of as a new article and has always retained its old name. The ancients said that good indigo when pulverized was of a blackish color and Pliny's test by fire for its genuineness was quite accurate, as pure indigo leaves little ash.

Archil: Pliny in his account of the dyeing of the Murex

mentions the fact that it was frequently bottomed with seaweed, which dyed the material a violet hue. This has been proved to have been lichen, and is described by the ancient Greek writer Discorides as Pontion, a plant which grew in Crete and Candia. It was principally used at that time for dyeing wool, and when freshly dyed was said to give a more brilliant color than the Murex purple.

Of other vegetable colors, Pliny also describes a shrub called "Cotinus," which has been identified as Fustic and which he falsely describes as dyeing purple. That it was largely used by the ancients is evident from his description of the color as being "famous."

Lutum, which has been positively identified as Weld, a species of wild mignonette and which was, until late years, largely cultivated in Europe, was likewise in use. Pliny mentions a process in conjunction with Chryscolla (a mineral) and schist alum—truly a scientific method of dyeing—and further described it as giving the tint of corn when in the state of the finest verdure.

Walnuts were also used by the ancient dyer. The green shell was used for dyeing wool and the nuts, while still very small, for dyeing the hair red. This seems an extraordinary explanation, but it is of importance, as we find the dyer of Persian rugs, famous to this day, using walnut husks to produce a cinnamon-chocolate shade.

Of mineral colors, mention is found of Chryscolla, and Cæorulum which is described by Pliny as a "liquid which is found in shafts of mines flowing through veins of gold," meaning a copper mine.

I have already referred to a process in which they were used as a dye in conjunction with Lutum, but that they were carbonate and hydrocarbonate of copper, respectively green and blue substances, is generally accepted among experts. Cæorulum was to be had in three qualities, viz., Egyptian, Scythian, and Cyp-

rian, the latter of which was the most sought after. This latter quality was said to have been produced in two qualities of light and dark blue. Among historians there is a good deal of contradiction regarding these colors, and Beckman in his "History of Inventions," argues that Chryscolla and Cæorulum may have sometime been real ultramarine. The original ultramarine was lapis lazuli or sapphire, and from the tombs of Thebes rings with sapphires were taken, which points to the Egyptians using the mineral for ornament and therefore why not for decorative purposes.

The name ultramarine is derived from a Persian word, and there are further authentic writings of its use in the sixth century, and also of its manufacture. In the eighth, ninth, and tenth centuries mention is made of it and one writer in the eleventh century in his exposition of a verse of Revelations says the sapphire (which is mentioned in Exodus) is that stone of which Lazurium is made. That tiles were enamelled with it is undoubted, and we may, therefore, assume that the dyers made use of it.

Phrygian stone is another dyer's mineral color and was probably oxide of iron, made soluble by means of wine and heat, but little reference is made of its use.

Apart from color, we find the ancient dyers were familiar with soap, salt, vinegar solutions of iron, tartar, alum, copperas, and nitre, and also of seaweed (or properly lichen) green walnuts, gall nuts, and bark.

Alum, called Alumen by Pliny, is described as being of two qualities. One which was white was used for dyeing wool bright colors and the other or darker shade for giving wool a tawny or darker shade. Beckman is of the opinion that it was an impure sulphate of iron, but Pliny's own description contradicts this.

Soap was largely used by the Romans and was described by Pliny as an invention of the Gauls for giving a reddish tint to the hair. "This substance," he continues, "is prepared from tallow and ashes, the best ashes being those of the beech and

yoke elm. There are two kinds, the hard soap and the liquid, both of them much used by the people of Germany, the men in particular more than the women." Beckman concludes that the German of that period colored his soap with a dye, hence its use for dyeing the hair red.

During the Egyptian and Roman periods, the uses and manufacture of earths and alkali, as well as that of sulphur as a bleaching agent was well understood. Here we have a list of drysalteries sufficient for the modern dyer, so that the ancient dyer was well equipped for the production of good colors.

In the description given of the commerce of Bablyon 539 B.C., we read of the luxurious carpets and nowhere so finely woven and with such brilliant colors as those made in Babylon. The close proximity to India and the commercial highway through the Persian Gulf, all point to India as being the pioneer in the art of dyeing, and the eagerness with which the Indian Lac was sought for dyeing scarlet garments is a further proof.

Darius, the King of Persia, in 521 B.C., made an expedition into India and returned with great spoils of gold and precious stones and again Alexander the Great, two centuries later, repeated the expedition and even penetrated into Afghanistan, returning with great spoils and that which was more valuable, all the known arts of the Indians. The subject is shrouded in a certain mystery, but facts point to the Indians as being the original dyers. With Persia, however, the art of making beautiful carpets is associated from the earliest times.

The Babylonian carpets, silk, and woolen fabrics, woven and embroidered with figures of mythic animals and with exquisite design, were not less famous for beauty of their texture and workmanship than for the richness and variety of their color. Such is the description of these articles made in 500 B.C. To-day the Persian carpet can still have the same description applied to it, and it is a remarkable fact that this trade has stuck to the Persians for nearly three thousand years.—*Journal Society Dyers and Colorists.*

SOME CONSTITUENTS OF RAW COTTON.

By systematically extracting cotton of various origins first with purely mechanical and subsequently with volatile "chemical" solvents, the author obtained the following results.

EGYPTIAN COTTON.

Cotton Wax A, which constitutes about 70 per cent. of the crude wax.

Cotton Wax B, constituting about 30 per cent. of the crude wax.

Alcoholic Extract.—The Egyptian cotton, from which the wax had been removed by means of benzol, was next extracted with alcohol and yielded 0.68 per cent. of a solid residue which was amorphous, of a rich brown color, and very hygroscopic.

Aqueous Extract.—The extraction with water which followed yielded 1.46 per cent. of a rich brown hygroscopic substance, similar in appearance to the alcoholic extract.

Ammonia Extract.—This was obtained by extracting with weak ammonia (25 cc. strong ammonia, sp. gr. 0.88, per litre) and amounted to 0.45 per cent.

Formic Acid Extract.—This extract was obtained by means of dilute formic acid (25 cc. formic acid per litre) and yielded 0.46 per cent. of a grayish-brown solid, which was not hygroscopic. It consists mainly of mineral matter.

TEXAS COTTON.

This was similarly treated and the result of the extractions is given below.

Cotton Wax.—The benzol extract yielded 0.55 per cent. of a crude wax similar in appearance to that obtained from Egyptian cotton.

Alcoholic Extract.—Similar in appearance to that obtained

from Egyptian. The amount obtained was 0.90 per cent. Exposed to the air for several days it took up 19 per cent. of water. This extract contained 1.07 per cent. nitrogen. Towards Fehling's solution it behaves as a powerful reducing agent, and this fact may be of some importance in bleaching on the one hand and on the bleeding of certain fast colors (Indanthrene, etc.), in boiling with caustic alkalis.

Aqueous Extract.—Darker in color than that obtained from Egyptian. The amount obtained was 1.61 per cent. Exposed to the air for two days it gained 9 per cent. in weight. It also reduced Fehling's solution, but not so powerfully as the alcoholic extract. The amount of nitrogen which it contains is 0.37 per cent. This extract shows an acid reaction to litmus.

Ammonia Extract.—Similar in appearance to that obtained from Egyptian. The amount obtained was 0.39 per cent. After evaporating to dryness it is only partially soluble in weak ammonia. The nitrogen was not estimated in this extract.

Formic Acid Extract.—This extract was obtained by means of dilute formic acid (25 cc. formic acid per litre) and yielded 0.46 per cent. of a grayish-brown solid, which was not hygroscopic. It consists mainly of mineral matter.

Hydrochloric Acid Extract.—This amounted to 9.43 per cent., and of all the extracts contained the highest percentage of nitrogen, viz., 9.8 per cent. This extract consists as would be expected largely of mineral matter.

BENGAL COTTON.

In this case only the crude wax was estimated, and this amounted as previously stated to 9.38 per cent. The portion soluble in petroleum spirit (Wax A) was of a clear orange color, while the residue (Wax B) consisted of an almost black friable mass. The results obtained are tabulated below for comparison.

	Egyptian Cotton per cent.	Texas Cotton per cent.	Bengal Cotton per cent.
Benzol Extract (crude wax)	0.47	0.55	0.38
Alcoholic Extract	0.68	0.90	...
Aqueous Extract	1.46	1.61	...
Ammonia Extract	0.45	0.39	...
Formic Acid Extract	0.46	0.72	...
Total Extract	3.25	4.17	0.38

After the formic acid extraction the Texas cotton was further extracted cold for two hours with hydrochloric acid of 2° Tw., and the extract evaporated to dryness on the water bath, as in the previous cases. It amounted to 0.43 per cent.

It will thus be seen that by purely mechanical solvents alone the amount of impurities extracted from Egyptian cotton was 2.67 per cent., and from Texas cotton 3.06 per cent., while further treatment by solvents which act chemically, although not drastic in their action, removed an additional 0.91 per cent. of impurities from Egyptian cotton and 1.11 per cent. from Texas cotton. Adding to the latter the 0.43 per cent. extract by hydrochloric, we have for Texas cotton 1.54 per cent. extracted by chemical means after the mechanical solvents employed had ceased to extract. Taking the total extract of the Texas cotton with the hydrochloric acid added, a grand total is obtained of 4.6 per cent., which is getting very near to the 5 per cent. usually supposed to be present. This figure must, however, be regarded as a more or less arbitrary one, and it is certain that some kinds of cotton contain more; in any case the loss in bleaching often considerably exceeds 5 per cent.—*E. Knecht, Ph.D.*

PART VIII

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